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FINAL ENVIRONMENTAL IMPACT STATEMENT

For the Proposed Issuance of a Multiple Species Incidental Take Permit for the Tacoma Water Habitat Conservation Plan, Green River Water Supply Operations and Watershed Protection, King County, Washington

VOLUME II

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1.0 Introduction

This FEIS Volume (II) was generated in response to public comments received by the Services pertaining to the public review draft of the Tacoma Water Habitat Conservation Plan, for the Green River Water Supply Operations and Watershed Protection, dated December 1999, and the associated Draft Environmental Impact Statement (DEIS), dated January 2000.

The remaining sections of this document include:

Section 2.0	Overview of Public Comments Received
Section 3.0	General Comments and Responses
Section 4.0	Specific Comments and Responses
Section 5.0	Revised HCP Chapters 5, 6, and 8
Section 6.0	References

2.0 Overview of Public Comments Received

This section provides an overview of the public comments that were submitted following the public comment period, which was held from 14 January to 14 March 2000.

2.1 Number of Comments Received

A total of 73 comment letters were received by the Services pertaining to the DEIS and HCP: 10 from government agencies, 2 from tribal representative organizations, 11 from public organizations, and 50 from individual citizens. Many of the comments and suggestions were incorporated into the HCP and FEIS. This FEIS Volume (II) contains: 1) copies of the comment letters, 2) summaries of comments and responses, and 3) a summary of changes made to the HCP and DEIS as a result of comments.

2.2 Process for Responding to Comments

The comments received ranged from detailed scientific comments, to expressions of opinion on various issues, to comments that were essentially votes on different alternatives. To make this large number and wide range of comments more accessible, 31 "General Comments" with associated responses were developed that summarized the range of issues raised in both oral testimony and written comments. These General Comments and Responses are provided in Section 3.0.

In addition to the General Comments and Responses, "Specific Comments" were identified and read by the appropriate Tacoma Water resource specialists and the Services, who prepared individual detailed responses. These Specific Comments and their associated responses are provided in Section 4.0.

Copies of all comment letters are located at the beginning of Section 4.0. Comment letters were divided into six categories: 1) Independent (IND), 2) Non-governmental Organization (NGO), 3) Tribal (TRI), 4) Federal (FED), 5) State (STA), and 6) Municipal agency (MUNI). To see how

comments were addressed, refer first to the appropriate category and then to the numbers in the margins of those comment letters. The margin numbers will direct the reader to one or more General Comment Response, or to a Specific Comment Response, or both.

2.3 Range of Comments

Comments were received on a wide range of issues. This range can best be summarized by listing the General Comments. Many of the Specific Comments can also be placed in these general categories, and Specific Comment Responses often refer back to a General Comment Response number.

<u>List of General Comments</u>

1. NMFS does not have authority to issue ITPs for salmon without a 4(d) rule.

2. The 50-year term of the Incidental Take Permit is too long.

3. Tacoma's commitment to habitat preservation and protection in the Green River Watershed must meet or exceed the City of Seattle's level of commitment to habitat protection in the Cedar River Watershed.

4. Water conservation measures and water reuse should be implemented for habitat preservation and restoration; instead of allowing Tacoma Water to withdraw more water from the Green River, Tacoma must be held to a higher standard of water conservation and reuse than is currently implemented.

5. Water users should be required to pay the full costs of habitat preservation and protection measures through rate increases as opposed to relying on revenue from timber harvest in the upper watershed.

6. Describe how Tacoma Water will coordinate with other landowners and managers in the upper watershed to restore and protect fish and wildlife habitat.

7. Tacoma Water should not be allowed to harvest timber in the upper watershed.

8. Tacoma Water should purchase more land in the upper watershed for the preservation and protection of fish and wildlife habitat.

9. Habitat Conservation Measure 3-01F, Salvage Harvesting, should be modified to prevent wide-scale forest harvest operations within the forest management zones.

10. Existing roads on Tacoma lands in the upper watershed should be abandoned, and no new roads should be constructed.

11. Riparian management measures proposed in Tacoma's forest management zones will not provide functional riparian habitat.

12. Tacoma Water should not be allowed to store additional water behind Howard Hanson Dam because of the impacts associated with inundation of reservoir riparian habitats.

13. Tacoma Water should not be allowed to store additional water behind Howard Hanson Dam because of the impacts to instream resources downstream of Howard Hanson Dam.

14. The operation agreement between Tacoma Water and the U. S. Army Corps of Engineers must be clearly described in the Habitat Conservation Plan.

15. Tacoma Waters' commitments to its partners in the Second Supply Project appear to affect Tacoma's commitment to implement measures described in the Habitat Conservation Plan; coordination agreements associated with the Second Supply Project must be clearly identified in the Habitat Conservation Plan.

16. Describe how Tacoma Water will coordinate with other landowners and managers in the lower watershed to restore and protect fish and wildlife habitat.

17. Instream flows should be increased to provide additional protection for fish.

18. The Woody Debris Management Program should be modified to restore the volume of woody debris that occurred naturally in the watershed.

19. The Woody Debris Management Program should be modified to address the effects of the program on recreational use of the river.

20. The sediment management plan needs additional detail and should be modified to restore the full function of sediment transport in the Green River.

21. Instream flows should be increased to provide additional recreational opportunity, and impacts to recreation should be mitigated.

22. Tacoma Water should be required to ladder Howard Hanson Dam to provide upstream passage of adult salmonids and should not be allowed to truck fish around the dam.

23. Tacoma Water must be required to guarantee the restoration of naturally reproducing populations of anadromous fish above Howard Hanson Dam.

24. Spawning and protective shore habitat in the Green River should be restored and preserved.

25. The Habitat Conservation Plan lacks quantifiable data and resource objectives.

26. The adaptive management provisions identified in the Habitat Conservation Plan must allow adjustments to the rate of municipal water storage and withdrawal if monitoring identifies additional impacts to fish and wildlife resources.

27. Instream flows should reflect natural flow variation rather than base or minimum flow requirements.

28. Use of the 'best available science', a federal Endangered Species Act requirement, was not incorporated in Tacoma's analyses of impacts in the Habitat Conservation Plan.

29. The direct and indirect effects of Tacoma Water's proposed water withdrawals on future urban growth must be clearly analyzed in the Environmental Impact Statement.

30. The cumulative impacts analyses in the Environmental Impact Statement should include related projects such as the Green River Second Supply Project and the Additional Water Storage Project.

31. The comment period for the DEIS/HCP should have been extended.

3.0 General Comments and Responses

1. NMFS does not have authority to issue ITPs for salmon without a 4(d) rule.

While it is true that the permitting authority for NMFS (50 CFR 222.307) states that, for a threatened species, section 9 "take" prohibitions must first be in place before a permit is issued, a permit can be issued that becomes effective on the date that "take" prohibitions become effective. In the case of this permit application, one species, Puget Sound chinook, is listed as threatened. A final ESA 4(d) rule was issued by NMFS on 10 July 2000 covering this species (65 FR 42422), and is scheduled to become effective in December 2000.

2. The 50-year term of the Incidental Take Permit is too long.

Both USFWS and NMFS regulations for ITPs outline factors to consider when determining permit duration (50 CFR 17.32 and 222.22). These factors include duration of the applicant's proposed activities and the expected positive and negative effects on covered species associated with the proposed permit duration. In determining the duration on an ITP, the Services also consider the extent of scientific and commercial data underlying the proposed HCP, the length of time necessary to implement and achieve benefits of the HCP, and the extent to which the HCP incorporates adaptive management strategies.

To date the Services have issued more than 300 ITPs varying in duration from 1 to 100 years. The average duration of ITPs is 25 years with the trend moving toward longer permit durations. The Services allow a range in ITP duration to account for both the varying biological impacts resulting from the proposed activity and the nature or scope of the permitted activity. Large-scale HCPs, like the Tacoma Water HCP, are likely to have longer term ITPs because of the time required to implement the Habitat Conservation Measures and the applicant's need for long-term assurances. Long-term permits also ensure long-term commitments to species conservation on the part of the permittee.

3. Tacoma's commitment to habitat preservation and protection in the Green River Watershed must meet or exceed the City of Seattle's level of commitment to habitat protection in the Cedar River Watershed.

Any applicant's commitment under an HCP, whether a public utility or private entity, must meet the issuance criteria of an ITP listed under Section 10(a)(2)(B) of the Endangered Species Act of 1973, as amended. These criteria are: 1) the taking must be incidental; 2) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; 3) the applicant will ensure adequate funding for the plan will be provided; 4) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and 5) the applicant will meet other measures that the Secretary may require as being necessary or appropriate for the purposes of the plan. The Services' decision whether or not to issue an ITP for any particular HCP is based on the proposed HCP meeting the above issuance criteria. Tacoma, like the City of Seattle and other HCP applicants, are subject to, and will be required to meet the same standards for an ITP.

To determine whether the issuance criteria can be achieved, each HCP must be evaluated on its own merit taking into consideration site-specific conditions, the nature and extent of covered activities, species addressed by the plan, and the proposed Habitat Conservation Measures developed to minimize and mitigate impacts to the maximum extent practicable.

4. Water conservation measures and water reuse should be implemented for habitat preservation and restoration; instead of allowing Tacoma Water to withdraw more water from the Green River, Tacoma must be held to a higher standard of water conservation and reuse than is currently implemented.

Tacoma Water exceeds all state requirements for water conservation and implements water conservation measures to forestall the need to develop new water supplies. Since 1987, Tacoma Water's conservation program has saved an estimated 17,860,000 gallons per day through the efforts of its ongoing supply and demand side water conservation initiatives.

Supply side water conservation measures are those that focus on improving water transmission and distribution systems. Tacoma Water has an active program of supply side water conservation measures that includes supply line leak detection and repair, transmission line leak detection and repair, hydrant upgrade and repair, large commercial meter testing, reservoir rehabilitation and replacement, and water distribution line replacement. Water savings from Tacoma's supply side conservation program have averaged about 5,820,000 gallons per day since 1987.

Demand side water conservation measures are those that focus on reducing customers' use of water. They include indoor and outdoor water use audits; marketing of low-flow water fixtures (such as showerheads and faucets), toilet and faucet retrofit devices, and irrigation system devices; rebates and grants; and education and public awareness initiatives. Water savings from Tacoma's demand side conservation program have averaged about 12,040,000 gallons per day since 1987.

Tacoma Water's conservation program has focused on systematically reducing water usage where there is the greatest opportunity to achieve documented water savings. Analysis of potential savings in Tacoma Water's service area indicates that the greatest conservation potential is among Tacoma Water's commercial, industrial, and institutional customers. Actual savings depend not only on water conservation programs, but also on factors such as water and sewer rates and the health of the local economy.

For over a decade, Tacoma Water has been working with the largest customers in its commercial, industrial, and institutional customer class to investigate ways to save water. The largest individual water user in Tacoma Water's service area, and one of the first to collaborate with Tacoma Water on reducing its water consumption, is the Simpson Tacoma Kraft mill. Between 1990 and 1999, the Simpson mill was able to cut its water consumption by 30 percent, from 30 million gallons per day (mgd) to 21 mgd. Since then, many of Tacoma Water's larger customers have implemented water- and energy-saving strategies. In the mid-1990s, prompted by the prospect of increasing sewer rates, Atlas Foundry, Pabco Roofing, and PW Pipe began recirculating cooling water instead of discharging it after one use. PW Pipe was able to reduce its water use by 97 percent. Atlas reduced its use 76 percent, and Pabco by 75 percent.

In 1999, Tacoma Water launched a conservation audit program for some of its largest industrial customers. The audits examined water use for Pioneer Chlor-Alkali, US Oil, G-P Gypsum, Continental Lime, and the Tacoma Public Works Department's Incinerator. Tacoma Water will use the information it obtains from the audits to provide these businesses with prioritized, financially attractive options for saving water.

Significant water savings have also been realized during the past decade through programs targeting residential water users. In 1993, 26,000 Tacoma Water customers had low-flow shower heads and faucet aerators installed in their homes and received toilet retrofit kits. Six months after this program ended, an estimated 90 percent of the participating customers retained and used these new products. In 1997, Tacoma Water collaborated with other northwest utilities in a program to provide rebates

to customers who purchased water- and energy-efficient washing machines. About 400 Tacoma Water customers took advantage of the program. Since 1994, Tacoma Water has offered water conservation seminars to help homeowners and landscape professionals learn about water-saving techniques for their homes and landscapes.

In 1992, Tacoma Water revised its rate structure for residential and wholesale customers to include a 25 percent higher rate for water use in the summer. At the same time, Tacoma Water eliminated its "declining block rate" for commercial, industrial, parks, and irrigation customers. Tacoma Water also amended its contract with Simpson Tacoma Kraft Company to encourage the company to reduce its water use without financial penalties.

In the past 20 years, the average daily water consumption rate among Tacoma Water households has declined even as the number of customers has increased. Although it is not possible to accurately estimate future water savings through conservation, Tacoma Water continues to help its customers identify and implement strategies that result in documented, measured savings. Future programs could include rebates for installing water-efficient plumbing fixtures and irrigation systems, education, demonstration gardens, and water use audits.

Despite the extensive effort Tacoma Water has made towards conserving water, the demand for water in Pierce and King Counties continues to increase with population growth. The State Growth Management Act, enacted in 1990, requires that these two counties plan for growth (RCW 36.70). Tacoma, Seattle, and a number of other cities in King County developed growth management plans as well to forecast and direct growth within their planning areas. Tacoma Water's municipal water development initiatives are made in response to the growth-related service requirements identified by Growth Management Act planning (see also General Comment Response 28). Because of the increasing demand for water supplies, Tacoma will need to make use of its water rights on the Green River of up to 213 cfs.

Water reuse is an alternative that is increasingly being evaluated to replace or augment water supplies in specific applications. With three wastewater treatment plants located in the Tacoma Water service area, water reuse has been seriously evaluated as a water supply alternative. In 1994, Tacoma Water contracted with CH2M Hill to conduct a water reuse feasibility study. The study considered two categories of uses for reclaimed water: landscape irrigation and industrial processes. Potential irrigation sites, such as parks, schools, and golf courses were identified in the vicinity of each wastewater treatment plant. Ten industries were also identified as potential candidates for

reclaimed water use. The reuse feasibility study concluded that alternatives using reclaimed water for industrial processes appeared to be more attractive than those alternatives using reclaimed water for landscape irrigation, primarily because of the cost of facilities attributed to distribution and part-time water usage. Further study was recommended to further define the feasibility of industrial reuse in the Tacoma area.

In 1997, two industrial conservation and water reuse assessments further studied the potential for reducing water consumption at two identified pulp and paper mills within or adjacent to the Tacoma Water service area. After conducting a water balance and evaluating water quality requirements, conservation measures and water reuse opportunities were identified. The results of the study indicated that an estimated 1.4 mgd of water savings were available through conservation and 5.2 mgd through water recovery and reuse at the Stone Consolidated West Tacoma mill (now the Abitibi mill) near Pierce County's Wastewater Treatment Plant. At the Simpson Tacoma Kraft mill near the City of Tacoma's Wastewater Treatment facility, up to 8 mgd of water conservation savings were identified along with 12 mgd of water savings through water recovery and reuse. The next step to be taken by Tacoma Water is to conduct a detailed engineering evaluation of the cost-effective conservation and water recovery measures. This would better define and quantify the volume of water savings, facilities, and costs necessary to achieve those water savings.

Tacoma Water recently added a new policy to its currently proposed Comprehensive Water System Plan Update that is designed to encourage water reuse among large users of irrigation water. The policy, entitled "Irrigation Supply for Large Users," requires that any new large user of irrigation water, such as a cemetery, park, or golf course, provide Tacoma Water with an assessment of other available water sources and estimates of the cost of source development. In the event that Tacoma Water does provide service to the new large user, the service will be considered an interruptible water supply.

The implementation of this policy will most directly involve Planned Residential Developments, or PRDs, that have golf courses proposed with residential developments. In the case of one newly developed PRD, Cascadia, Tacoma Water has agreed to supply an interim irrigation source for the Cascadia golf course until the Town of Orting's sewer plan amendment can be completed. This cooperative agreement calls for a treated effluent line from the Sewage Treatment Plant to provide irrigation water to the golf course.

5. Water users should be required to pay the full costs of habitat preservation and protection measures through rate increases as opposed to relying on revenue from timber harvest in the upper watershed.

Tacoma's Forest Lands Management Plan, which is part of the HCP, designates its 14,888 acres into Natural, Conservation, and Commercial Forest Management Zones. Timber harvest may occur in both the Conservation and Commercial Zones for a maximum harvest of 80 acres per year. The opportunity to harvest timber would provide Tacoma Water with revenue to provide for watershed improvements, including fish and wildlife habitat modification and protection measures, land purchases, and sustainable forest management.

Tacoma's Forest Management component in the HCP exceeds all state requirements for habitat protection. Tacoma would comply with any future changes to federal and state requirements through adaptive management.

Evaluation of the environmental effects of the proposed timber harvest included in this HCP has resulted in the determination that it can be conducted within the constraints of the ESA (General Comment Response 7). Tacoma Water has a responsibility to its ratepayers to provide water at the lowest rates possible commensurate with its cost of operations including environmental responsibilities. Tacoma's ratepayers would bear a substantial portion of the cost to implement HCP conservation measures with or without timber harvesting. However, timber harvest revenue would reduce the increased cost to Tacoma Water's ratepayers to implement the HCP.

6. Describe how Tacoma Water will coordinate with other landowners and managers in the upper watershed to restore and protect fish and wildlife habitat.

Tacoma has cooperative agreements with all the major public and private landowners in the Upper Green River Watershed that benefit fish and wildlife habitat. The following summarizes these coordination activities and habitat benefits.

Some landowner agreements date back to 1914 and have been updated to reflect changes in water quality regulations, forest practices rules, land ownership, and transportation needs. The main focus of these agreements is to control human activities (trespass, fire, and forest practices) within the watershed that may degrade water quality. These agreements are administered by Tacoma's Water Quality Section and implemented by watershed inspectors who are in the watershed 7 days a week.

These agreements would be kept in force through the 50-year term of the HCP. In conjunction with these agreements, Tacoma meets regularly with watershed landowners to discuss various planned forest management activities and concerns regarding any impact to water quality.

In developing this HCP, Tacoma Water and the Services took into account existing HCPs and forest management plans on adjacent lands to coordinate the assignment of the forest management zone in Tacoma's HCP to best fit the goals of the adjacent landowner and Tacoma Water. This resulted in designating approximately 1,500 acres in the Natural Zone adjacent to the U.S. Forest Services' Snoqualmie Pass Adaptive Management Area and the Kelly Butte Roadless Area. This will provide mature habitat for a north and south dispersal corridor for listed species. Tacoma's HCP contributes to adjacent landowner's habitat conservation through its conservation measures and strategic land ownership. One such conservation measure, HCM 3-03J Culvert Improvements, would allow fish passage up and down streams providing access to stream habitat on adjacent landowner properties.

Tacoma would continue to participate in state Watershed Analyses under HCM 3-03A. This process gives Tacoma another opportunity to coordinate forest management practices among adjacent landowners in the watershed. In the past Tacoma Water has participated on the assessment and prescription team on five of the total of six Watershed Administrative Units (WAU) in the upper Green River Watershed. The last Watershed Analysis has been started and should be completed in 2001. The 5-year review of the Lester Watershed Analysis is due in 2003, and Tacoma will participate in this review as well.

Tacoma Water also receives copies of all state Forest Practices Applications (FPA) submitted by watershed landowners for review and comment. If Tacoma sees a potential water quality problem caused by an FPA, the landowner is contacted and asked to modify its application, or the DNR is asked to condition the application.

Tacoma Water and the USACE are developing an operating plan to coordinate the activities of both parties in the watershed. The primary purpose of this coordinating document is to assure that both the USACE and Tacoma Water comply with the ESA. As responsible agencies under the ESA, the USFWS and NMFS will facilitate this coordination. This agreement will outline responsibilities for construction, operation, maintenance, and monitoring of the various conservation measures in the HCP.

7. Tacoma Water should not be allowed to harvest timber in the upper watershed.

Several comments suggested that Tacoma Water should cease all commercial timber harvesting on City lands in the Upper Green River Watershed. Tacoma currently harvests timber from its lands to generate revenue and/or enhance fish and wildlife habitat. In keeping with the Forest Land Management Plan Tacoma prepared for the watershed in 1996, timber harvesting occurs at a very low rate and is subject to several self-imposed restrictions to protect water quality and habitat for fish and wildlife. As part of its current application to the Services for an ITP, Tacoma has requested coverage for its timber harvesting and other watershed management activities. During development of the HCP, the Services suggested and Tacoma accepted several additional restrictions on timber harvest activity to minimize and mitigate the impacts of any authorized incidental take in the upper watershed. These new restrictions, along with the original restrictions of the Forest Land Management Plan, are included in Tacoma's HCP. Prior to issuance of the ITP, the Services will review the HCP, assess the anticipated level of incidental take, and determine whether the HCP measures provide adequate mitigation to meet the criteria of ESA Section 10(a)(2)(B). Beyond requiring Tacoma Water to meet those ITP issuance criteria, the Services cannot impose additional restrictions on Tacoma's activities or disallow timber harvesting in the upper watershed.

Preliminary review of the Tacoma Water HCP by the Services suggests the proposed mitigation in the upper watershed is adequate for at least three reasons:

- the proposed level of timber harvesting will affect a small percentage of Tacoma's ownership on an annual basis, and an extremely small percentage of the Upper Green River Watershed overall;

- the proposed timber harvesting is compatible with the protection of fish and wildlife habitat and the maintenance of surface water quality in the Upper Green River Watershed; and

- the proposed level of mitigation would meet or exceed the level of mitigation and resource protection provided by other approved forestland HCPs in the region, and would be roughly comparable to the Northwest Forest Plan for the management of federal lands administered by the U. S. Forest Service and the U.S. Bureau of Land Management.

Each of these items are discussed in detail below.

Proposed Level of Harvesting: Tacoma owns 14,888 acres in the Upper Green River Watershed and manages the land in three zones (Natural, Conservation, and Commercial). The City's ownership represents approximately 10 percent of the total area of the watershed above the headworks dam. Of the 14,888 acres, Tacoma Water would conduct even-aged harvesting (clearcutting) on an average of no more than 1.5 percent of the conifer-dominated stands in the Commercial Zone each year (approximately 27 acres under current conditions). Tacoma would also conduct uneven-aged harvesting (commercial thinning) for wildlife habitat improvement on an average of no more than 2 percent of the conifer-dominated stands in the Conservation Zone in any year (approximately 24 acres under current conditions). This uneven-aged harvesting would only occur in stands less than 100 years old, and would cease once all conifer-dominated stands in the Conservation Zone reach 100 years of age. Lastly, hardwood conversion (clearcutting of alder stands and replanting with young conifers) would occur on an unlimited number of acres in the Commercial and Conservation Zones each year until all sites capable of supporting conifer-dominated stands are converted. Tacoma Water estimates that hardwood conversion would occur on approximately 29 acres each year. Uneven-aged harvesting and hardwood conversion are largely measures to return Tacoma lands to the type of forest that dominated the watershed prior to early timber harvesting, but they are included here because they involve the harvest of overstory vegetation. The combined harvesting (even-aged, uneven-aged, and hardwood conversion) covered by the ITP would involve no more than 80 acres per year. This 80 acres amounts to approximately 0.5 percent of Tacoma's ownership in the upper watershed, and 0.05 percent of all ownerships in the upper watershed.

Compatibility of Timber Harvesting: The Upper Green River Watershed has been managed for commercial timber production for several decades without impairing Tacoma's ability to withdraw clean, safe water from the river. Recent changes in the management of other lands in the upper watershed will only improve surface water quality, and further reduce the potential for conflicts between timber harvesting and other resource uses such as fish and wildlife. Federal lands in the upper watershed are now managed under the Northwest Forest Plan, state lands are managed under the DNR HCP, Plum Creek Timber Company lands are managed under an HCP, and all other lands will be managed according to the Forests and Fish Report as it is implemented through Washington Forest Practices Rules. Given this increased level of attention to fish, wildlife, and surface water quality throughout the upper watershed, the proposed harvesting of commercial timber from Tacoma lands is expected to have overall negligible adverse effects.

Proposed Mitigation: Impacts to listed species from timber harvesting on Tacoma Water lands are expected to be minor because of the limited number and location of acres affected in any year. To mitigate for the impacts, Tacoma Water would:

- dedicate 5,850 acres (including 4,619 acres of forest land) as no-harvest Natural Zone for the full term of the HCP;
- dedicate 5,180 acres (including 3,193 acres of forest land) as Conservation Zone where commercial timber harvesting would occur only to accelerate the development of late-seral coniferous forest conditions in stands less than 100 years old;
- manage the remaining 3,858 acres as commercial forest land on a 70-year harvest rotation (approximately 20 years longer than the industry standard in western Washington);
- conduct salvage logging only in the Commercial Zone, in stands less than 100 years old in the Conservation Zone, and along roads in the Natural Zone where human safety is a concern;
- retain snags, green recruitment trees, and logs at the time of commercial harvesting at double the rate required under current Forest Practices Rules;
- limit the size of even-aged harvest units to 40 acres and uneven-aged harvest units to 120 acres;
- conduct no timber harvesting on sites incapable of sustaining commercial timber production under a 70-year rotation (i.e., sites of low productivity where the Douglas-fir 50-year Site Index is less than 80);
- limit the amount of post-harvest slash burning;
- implement riparian and wetland buffers that exceed the requirements of the Forests and Fish Report; and

- implement several site-specific measures to protect listed wildlife species during timber harvesting, road construction, and other management activities.

8. Tacoma Water should purchase more land in the upper watershed for the preservation and protection of fish and wildlife habitat.

Tacoma Water actively evaluates all opportunities to purchase land in the upper watershed with the primary goal of protecting water quality. This leads to acquisition of lands in the riparian corridor around the mainstem of the Green River and its major tributaries and sensitive areas close to the river that could adversely affect water quality. This effort to protect water quality also results in the preservation and protection of fish and wildlife habitat.

Tacoma Water continuously carries out a program of evaluating land that becomes available in the watershed for purchase. Land often becomes available with little or no notice, and the opportunity to acquire additional land may pass if not acted upon swiftly. Tacoma intends to continue its policy of acquiring land in proximity to the Green River and its tributaries as it becomes available to protect water quality. The amount of land purchased is limited by revenue and the availability of willing sellers, but opportunities may be expanded by cost sharing with other parties interested in protecting land in the Green River Watershed.

9. Habitat Conservation Measure 3-01F, Salvage Harvesting, should be modified to prevent wide-scale forest harvest operations within the forest management zones.

Salvage harvesting of timber is addressed in HCM 3-01F. This measure already places several restrictions on salvage harvesting to ensure it will not lead to wide-scale timber harvesting. On the contrary, salvage harvesting would be used primarily to limit the effects of natural mortality and to maintain mature coniferous forest on the Covered Lands. Without salvage harvesting, it could become difficult for Tacoma Water to maintain mature coniferous forest and to meet habitat goals of the HCP.

As stated in HCM 3-01F, salvage harvesting may only occur subject to the following conditions:

- There would be no salvage harvesting in the Natural Zone, in stands over 100 years old in the Conservation Zone, in riparian and wetland buffers in the Conservation and Commercial Zones, and on sites with a Douglas-fir site index of 80 or less. This

represents at least 4,619 acres (approximately 40% of the Tacoma Water ownership in the upper watershed) where there would be no salvage harvesting allowed.

- Salvage harvesting may occur in stands less than 100 years old in the Conservation Zone only when insects, fire, windthrow, or disease reduces the total canopy closure to less than 40 percent over 2 or more acres.

- Salvage harvesting may occur in the Commercial Zone only when insects, fire, windthrow, disease, or flood reduces total canopy closure to less than 40 percent over 2 or more acres;

- Salvage harvesting may occur on a selective basis within 150 feet of roads in all zones where individual trees present a safety hazard to humans.

- Individual salvage harvest areas would not exceed 120 contiguous acres (Note: this measure has been revised in response to public comment to eliminate the option for conducting larger salvage harvests).

- All snag, green recruitment tree, and log requirements of HCM 3-01G would apply to salvage harvesting.

When conducting salvage harvesting, Tacoma Water would remove only dead, dying, and damaged trees from areas of extensive mortality, unless the removal of live trees is necessary to obtain access to dead and damaged material. This is done to limit the further spread of disease and insects, to expedite reforestation of affected areas, and to capture the economic value of the trees before they rot (Note: this measure has been revised in response to public comment).

The general environmental concerns about salvage harvesting are that it can cause site disturbance, and it can result in the complete removal of dead and dying trees that are important elements of fish and wildlife habitat. Both of these concerns are addressed in the Tacoma Water HCP. Site disturbance and the removal of important habitat elements would be limited by excluding salvage harvesting from the Natural Zone and in stands more than 100 years old in the Conservation Zone (except along roads), as well as from no-harvest buffers on streams and wetlands. Site disturbance would be limited because salvage harvesting must be consistent with all HCP measures that restrict activity on steep and unstable slopes and in other areas sensitive to the use of heavy equipment.

Where salvage harvesting does occur, sufficient numbers of snags, green retention trees, and logs would be retained because of the requirements of HCM 3-01G.

Salvage harvesting is a particularly important part of the Tacoma Water HCP because of the small size of the Tacoma Water ownership. It is a goal of the HCP to provide late-seral coniferous forest habitat for fish and wildlife. Natural mortality from insects, disease, wind, or fire could impact a significant portion of the Covered Lands if allowed to spread unchecked, and reduce the ability of Tacoma Water to meet its habitat goal. While catastrophic tree mortality is a natural component of the forest landscape, the effects of such mortality are far greater now than they were when late-seral forest existed across the Pacific Northwest. The loss of several hundred acres of mature forest to natural mortality was insignificant when the region supported several million acres of similar habitat. The effects of such a loss today are quite different, however, because the total area available for management is only a few thousand acres. Tacoma Water's intent under the HCP is to retain the beneficial aspects of tree mortality (e.g., dead and dying trees and logs) while preventing the mortality from eliminating late-seral forest habitat altogether.

Lastly, the protection of the vegetative cover within the watershed is important for protecting water quality. Allowing large areas of the watershed to be impacted by fire, insects, or disease would be counter to Tacoma Water's efforts to maintain water quality.

10. Existing roads on Tacoma lands in the upper watershed should be abandoned, and no new roads should be constructed.

Tacoma Water maintains roads in the Upper Green River Watershed to meet a number of management-related needs. Roads are maintained to facilitate essential watershed management activities (e. g., water quality sampling, safety and security patrol, and fire suppression), to conduct forestry operations (including commercial logging), and to comply with joint access agreements with other landowners in the watershed. Watershed management and compliance with joint access agreements are mandatory activities, which Tacoma Water cannot unilaterally discontinue. These needs would continue under the HCP, so abandonment of roads is not always practicable. Commercial logging on Tacoma Water lands is an optional activity, but as explained in the response to General Comment 7, it is an activity that would be done in a manner consistent with the Services' conservation goals for listed species in the upper watershed.

Given the need to maintain roads in the upper watershed, Tacoma Water is committed to minimizing the environmental impacts of those roads. Several Habitat Conservation Measures (HCM 3-03B through 3-03J) are designed specifically for this mitigation purpose. New roads would be constructed to state standards for excavation, surfacing, and drainage in effect at the time of construction to minimize mass wasting, surface erosion, and interruption of fish movements. Existing roads would be upgraded, as needed, to meet those same standards. Roads that are no longer needed would be abandoned, again in compliance with current standards to control mass wasting and erosion.

To minimize the impacts of road use, Tacoma Water would discontinue heavy truck traffic under its control (e.g., log hauling) when there is a potential for an impact on water quality that could adversely affect fish habitat (HCM 3-03G). Tacoma Water would also modify or halt road construction under its control when needed to avoid disturbing covered wildlife species during nesting, denning, and/or foraging (HCM 3-04A, 3-04B, 3-04C, 3-04D, 3-04G, 3-04H, 3-04I, 3-04J, 3-04K, 3-04M, 3-04O, 3-04Q and 3-04U). The Services expect that management of roads under these provisions of the HCP will ensure that impacts to listed fish and wildlife species will be minimized.

11. Riparian management measures proposed in Tacoma's forest management zones will not provide functional riparian habitat.

Riparian habitat is considered to be properly functioning if "the riparian reserve system provides adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatersheds, and buffers or includes known refugia for sensitive aquatic species" (National Marine Fisheries Service 1999). Strategies for achieving properly functioning riparian ecosystems are identified in the NMFS recent proposed chinook salmon 4(d) rule for seven ESUs in Washington and Oregon (50 CFR 223). The 4(d) rule identifies the Forests and Fish Report as an appropriate strategy for maintaining and achieving proper riparian function in managed forest lands.

The riparian protection strategy proposed by Tacoma would best be considered a natural succession and growth strategy as described in 50 CFR 223. The Tacoma HCP establishes riparian management zones that are at least 200 feet wide along both sides of all fish-bearing streams. No timber harvest would occur within at least the first 150 feet of the management zones along fish-bearing streams. Disturbances by road crossings or cable yarding corridors would be limited to a small proportion of the riparian area. In addition, 50- to 25-foot-wide no-cut buffers would be left

adjacent to all perennial and seasonal non-fish bearing streams. The no-cut buffers on perennial streams would be increased to 100 feet around sensitive sites known to provide refugia for amphibian species.

A recent review of over 28 separate studies suggests that buffer widths of 150 feet equal or exceed the width necessary to maintain riparian habitat functions including water temperatures, LWD recruitment, nutrient input, sediment and pollutant filtration, and erosion control (Knutson and Naef 1997).

12. Tacoma Water should not be allowed to store additional water behind Howard Hanson Dam because of the impacts associated with inundation of reservoir riparian habitats.

Tacoma Water acknowledges that storage of water behind Howard Hanson Dam for municipal use will have environmental impacts on the reservoir shoreline. Howard Hanson Dam is a federal facility operated by the USACE. The dam is currently operated for flood control, with secondary fisheries benefits. The USACE is proposing to store additional water behind the dam in the future under the Additional Water Storage Project, which is described on page 2-11 of the HCP. The majority of water stored under the Additional Water Storage Project would come from Tacoma's Second Diversion Water Right of 100 cubic feet per second (cfs). Most of the water would be released from behind Howard Hanson Dam and subsequently withdrawn downstream at Tacoma's Headworks to meet water supply needs in late summer and fall. Portions of the stored water would also be released to increase instream flows in the lower river to benefit fish and other aquatic resources.

Phase 1 of the Additional Water Storage Project would result in a pool raise from the existing high pool elevation of 1,147 feet to a high summer pool under Phase 1 of the project of 1,167 feet. In Phase 1, up to 280.5 acres of additional reservoir riparian area would be inundated during the summer. Tacoma Water would retain 229 acres of existing forest within the new inundation zone under HCM 2-04. Phase 2 of the Additional Water Storage Project would result in a summer pool raise to 1,177 feet, but Phase 2 of the Additional Water Storage Project is not addressed by the HCP. The Additional Water Storage Project would not affect winter flood control operations, and past winter flood control operations have inundated the reservoir shoreline up to elevation 1,183 feet. Impacts associated with reservoir inundation would be compensated by the mitigation and monitoring measures proposed by the USACE as part of the Additional Water Storage Project. The effects of the reservoir inundation and analyses of the required level of mitigation were addressed

in the Environmental Impact Statement for the Additional Water Storage Project and are not included in the HCP analyses.

Since Tacoma Water is the local sponsor of the Additional Water Storage Project, and Tacoma Water staff may implement some of the measures, mitigation and monitoring activities associated with the Additional Water Storage Project were included as covered activities by Tacoma's ITP and described in the HCP. Tacoma is requesting authorization for implementing mitigation and monitoring measures, but authorization for project impacts to covered species associated with reservoir inundation must be issued to the USACE through the processes described in Section 7 of the ESA. That process is occurring concurrent with the review of Tacoma's request for an ITP under Section 10 of the ESA. The relationship between Tacoma Water and the USACE is discussed in subsection 2.7 of the HCP. The Services will review the Additional Water Storage Project under Section 7 of the ESA, and will ensure that all appropriate steps are taken to avoid and/or mitigate for any impacts to listed species. The Additional Water Storage Project will not proceed until the USACE satisfies the requirements of the ESA through the Section 7 process.

13. Tacoma Water should not be allowed to store additional water behind Howard Hanson Dam because of the impacts to instream resources downstream of Howard Hanson Dam.

As previously noted in General Comment Response 12, Howard Hanson Dam is a federal facility operated by the USACE. The storage of water behind Howard Hanson Dam under the Additional Water Storage Project is a federal activity that cannot be covered by the Section 10 ITP being requested by Tacoma. An ITP can only be issued to a non-federal entity. Instead, ESA coverage for the Additional Water Storage Project is being pursued by the USACE through the ESA Section 7 process simultaneous with Tacoma's application for an ITP. Consequently, the Services are not in a position to approve or deny the Additional Water Storage Project as part of Tacoma's request for an ITP.

Tacoma is the local sponsor of the Additional Water Storage Project, and as such, is responsible for paying a portion of the costs of the project. Tacoma acknowledges its responsibility to participate in mitigating the adverse environmental effects of raising the level of the reservoir during the spring and summer, but the act of storing water behind Howard Hanson Dam is a USACE action to be addressed through the Section 7 ESA process. The effects of water storage behind Howard Hanson Dam are not covered by Tacoma's ITP; but should Tacoma, as the local landowner, conduct

mitigation activities, the implementation of that mitigation would be covered under Tacoma's Proposed ITP.

14. The operation agreement between Tacoma Water and the U. S. Army Corps of Engineers must be clearly described in the Habitat Conservation Plan.

Tacoma Water and the USACE are in the process of developing an operating plan that will coordinate the activities of the USACE at Howard Hanson Dam and Tacoma's operations as a water utility. When completed this operating agreement will be subject to the requirements of the HCP as well as requirements placed on the USACE through Section 7 of the ESA. It will not be a part of the HCP due to the need to make adjustments and changes to the operating plan as new information is obtained. The primary purpose of this coordination document is to assure that both the USACE and Tacoma Water coordinated their ESA efforts. The USFWS and NMFS have oversight of both the USACE and Tacoma Water under the ESA and will facilitate this coordination.

15. Tacoma Waters' commitments to its partners in the Second Supply Project appear to affect Tacoma's commitment to implement measures described in the Habitat Conservation Plan; coordination agreements associated with the Second Supply Project must be clearly identified in the Habitat Conservation Plan.

All of Tacoma's commitments to its partners in the Second Supply Project are subject to requirements of the HCP under Section 10 of the ESA. Tacoma's partners in the Second Supply Project agree to take water from Tacoma's Second Diversion Water Right on an as-available basis. This means that if instream flow thresholds identified in the HCP limit Tacoma's ability to divert water under the Second Diversion Water Right, then neither Tacoma Water nor its partners would be able to divert water during that time period. Water that has previously been diverted to storage at Howard Hanson Dam during periods of higher river flow can be taken from storage and utilized by Tacoma Water and its partners at any time.

Tacoma Water and the Services are currently unaware of any conflicts between the City's commitment to its partners and its obligations under the proposed HCP. Tacoma's commitments to its Second Supply Project partners were made with full knowledge and understanding of the fisheries flow obligations in the HCP, specifically to avoid conflicts. If conflicts arise in the future, Tacoma's obligations under the HCP would be modified only with the approval of the Services and only through the ITP/HCP amendment processes of the ESA. Public notification and analyses of environmental effects would be required for any major amendment to the HCP.

16. Describe how Tacoma Water will coordinate with other landowners and managers in the lower watershed to restore and protect fish and wildlife habitat.

The primary vehicle for the coordination of flow management in the lower Green River Watershed would be through the Green River Flow Management Committee, as noted in the HCP (page 5-39). As part of its ESA consultation requirements, the USACE has committed to convening the Committee and coordinating future flow management decisions. The Green River Flow Management Committee already meets on an ad hoc basis and consists of representatives of tribal, regulatory, resource management, and non-governmental agencies convened by the USACE to recommend adaptations in the water storage and the release regime of Howard Hanson Dam.

While the Committee is expected to make flow management recommendations to the USACE, it is ultimately the responsibility of the Services to ensure Tacoma's fish and wildlife conservation measures are in compliance with the ESA. Tacoma's annual reporting and 5-year summary reviews (HCP Chapter 6) would provide the Services with ample opportunity to ensure coordination of fish and wildlife measures with other landowners and managers in the lower Green River basin.

Tacoma Water is committed to water resource management planning efforts within the basin. In addition to commitments identified in the HCP, Tacoma is presently coordinating with basin-wide, natural resource management programs such as the Green/Duwamish Ecosystem Restoration Study and the Water Resource Inventory Area (WRIA) 9 planning effort. In WRIA 9, Tacoma participates on both policy and technical committees of the King County sponsored planning effort. This planning effort is evolving, and Tacoma Water expects it to become the focus for basin protection, restoration, and project coordination efforts. Although the current process has not been sanctioned by the Services as leading to satisfaction of ESA requirements, Tacoma expects that this process will evolve into, or be replaced by, a planning process that meets ESA requirements.

Tacoma also intends to cooperate with Ecology during Total Maximum Daily Load studies of the Green River. The Green River basin is the primary source of water for the City of Tacoma, and the City can be expected to take an active interest in reviewing future activities of other landowners and managers.

17. Instream flows should be increased to provide additional protection for fish.

The Services expect that the instream flow measures described in its HCP and guaranteed through the IA will contribute to the recovery of listed species and may help preclude the need to list other species addressed in the HCP. The instream flow measures proposed by Tacoma in its HCP were developed as a result of nearly 15 years of technical studies, analyses, negotiations, administrative hearings, and settlement agreements. The proposed conservation measures, as described in HCP Chapter 5, are designed to:

- provide instream flows during the summer (that are higher than Ecology's instream flows) by restricting Tacoma's existing First Diversion Water Right claim and Second Diversion Water Right;

- provide a minimum flow during extreme droughts that would require Tacoma to augment flows if inflow is less than 225 cfs (measured at Auburn);

- cap Tacoma's First Diversion Water Right claim at 113 cfs;

- limit pumping from well fields adjacent to the North Fork Green River to periods when turbidity in the mainstem Green River prevents direct water withdrawal at Tacoma's Headworks; and

- establish a procedure for limiting pumping-related stage reductions in the North Fork Green River to no more than 1 inch per hour to partially protect adult salmon refugia.

These measures are designed to protect important fishery habitats in the Green River basin consistent with annual differences in precipitation and flow availability. Because of timing, the ecological benefits of such flows would include improvements in both habitat quantity and quality compared to baseline conditions. With respect to quantity, the flows would provide for a variety of important and seasonally specific life history stage requirements (see HCP, Appendix A), including adult salmon holding and spawning habitat, egg incubation, emergence of steelhead fry, and upstream passage of adult salmon (see HCP, Chapter 7). The flows for the period from 15 July to 15 September approximate those identified as providing peak adult chinook holding, and rearing habitat for juvenile chinook, coho, and steelhead in the section of river below the Tacoma Headworks (Caldwell and Hirschey 1989). The flows specified for Auburn (i.e., 400 cfs) for the

same time period (15 July to 15 September) would likewise partially protect adult chinook and steelhead holding habitat and steelhead juvenile habitat. Anticipated benefits include improved, but still only partially protected steelhead egg incubation and fry emergence, increased juvenile rearing habitats, increased early summer holding habitats for adults and juvenile fish, and increased attraction flows to facilitate adult returns to the river compared to baseline conditions.

The flows would also increase the amount of available freshwater habitat in the Green/Duwamish estuary during the summer extreme low-flow periods. Benefits related to habitat quality during extreme low flow periods would likely include reductions in water temperatures during the summer months immediately below Howard Hanson Dam, increases in or maintenance of dissolved oxygen (DO) levels, and the potential dilution of nutrients and introduced pollutants in the lower Green River. Maintenance of minimum flows would provide a level of resource protection, but would not provide the full range of flow variability needed to satisfy ecosystems functions. Flow variation, to the extent allowed within the operation of Howard Hanson Dam for flood control, are provided by other Habitat Conservation Measures.

The management of flows to minimize impacts to aquatic resources requires the participation of the Green River Flow Management Committee. During the winter months, there is little opportunity to modify flows for fish because the USACE operates Howard Hanson Dam for flood control. Between late October and February, there is no water stored for flow augmentation; however, during the period mid-February through mid-June, relaxation of flood control rules and conservation measures within the HCP provide resource managers much greater opportunity to manage flows than is presently available. During this period, members of the Green River Flow Management Committee would have increased responsibility for adaptively managing flows in the Green River. The storage of water for flow augmentation purposes also allows resource managers the opportunity to modify flows through the summer and early fall. As part of the HCP, Tacoma Water has committed to funding an extensive research and monitoring program to provide resource managers the feedback necessary to adjust flows to benefit instream resources.

18. The Woody Debris Management Program should be modified to restore the volume of woody debris that occurred naturally in the watershed.

The Woody Debris Management Program described in the HCP is designed to partially restore the ecosystem functions of wood transport affected by non-Tacoma activities. On Tacoma lands, Tacoma has established a Natural Zone. The Natural Zone covers Tacoma-owned lands adjacent to the Green River, Howard Hanson Reservoir, and major tributaries. Tacoma would conduct no timber harvesting in the Natural Zone except to modify fish and wildlife habitat or to remove danger trees within 150 feet of roads (see HCM 3-01B). In addition to harvest restrictions in the Natural Zone, Tacoma would retain no-harvest riparian buffers along all streams on Tacoma lands in the Upper HCP area (see HCM 3-02A). As part of the Additional Water Storage Project, Tacoma Water would also contribute funds for a series of habitat rehabilitation projects above Howard Hanson Dam, including large woody debris placement (see HCM 2-03). These measures are designed to enhance wood recruitment and to mitigate for direct and indirect effects of water supply operations in the Upper Green River Watershed.

In addition to proposing measures to address the effects of water supply activities in the upper watershed, Tacoma Water has proposed to contribute to partially restoring woody debris functions in the middle and lower Green River affected by non-Tacoma activities. The operation of Howard Hanson Dam by the USACE for flood control interrupts the downstream transport of woody debris from the upper watershed. Flood control and land-use activities by other non-Tacoma entities also affect the recruitment of woody debris to the Green River below Howard Hanson Dam. The Woody Debris Management Program (see HCM 2-08) proposed in the HCP is designed to partially restore ecosystem functions of woody debris recruitment and transport affected by non-Tacoma activities.

Tacoma is cooperating with the USACE on development of the Woody Debris Management Program, which will be implemented under the Additional Water Storage Project. Planning for the project is currently at the 35 percent design phase. More specific recommendations on the size, methods, and location of LWD placement sites are under development (e.g., Perkins 1999a), and would be provided to the Services for review as they are completed. As indicated in the HCP, while the final woody debris placement location and methodology may be refined based on more detailed analysis, there is a firm commitment to contribute to, but not to fully restore the functions of woody debris downstream of Howard Hanson Dam. Compliance monitoring conducted by Tacoma under the HCP would document whether the amount of wood placed meets the objectives specified in the HCP.

19. The Woody Debris Management Program should be modified to address the effects of the program on recreational use of the river.

Restoration of ecosystem processes is a major objective of the HCP; and while the Woody Debris Management Program may have an effect on recreation use of the river, the program is an integral part of Green River restoration efforts. Effects upon recreational boating have been identified as a concern (e.g., Perkins 1999a). Separate and apart from the HCP, the USACE and Tacoma Water would seek additional input from recreational boating interests regarding the Woody Debris Management Program as part of the Additional Water Storage Project.

The Woody Debris Management Program must be approved by the Services prior to wood transport and/or placement. Details of the woody debris management program are being developed in coordination with the Services and other resource management agencies, and potential effects of the program on recreational boating would be considered prior to transport and/or placement of wood below Howard Hanson Dam.

20. The sediment management plan needs additional detail and should be modified to restore the full function of sediment transport in the Green River.

As noted in the introductory material provided on page 5-2 of the HCP, the proposed gravel nourishment program (HCM 2-09) is a Type 2 Conservation Measure, consisting of contribution of funds and/or implementation of measures designed to offset or compensate for impacts resulting from a non-Tacoma action. In the case of gravel-nourishment, the action responsible for the majority of alteration in the sediment transport regime was construction and operation of Howard Hanson Dam, a USACE project sponsored by King County. Under the HCP, Tacoma Water proposes to provide funding to the USACE to restore a portion of the gravel necessary to maintain spawning habitat in the lower Green River. Additional gravel will be placed by the USACE and King County under the Green-Duwamish General Investigation study and through ongoing Section 7 consultation between the USACE and the Services. Coordination of the gravel nourishment program will be the responsibility of the USACE.

The primary responsibility for development of the final gravel nourishment plan and restoration of gravel transport to fully functional levels belongs to the USACE. As such, the USACE is currently developing a detailed sediment management plan, which includes planning and coordination of the gravel nourishment program. Several additional studies intended to further evaluate existing

conditions of armoring and channel degradation, to corroborate the proposed gravel placement rate, to identify specific gravel placement sites and methods, and to describe additional studies and data needed for project design have recently been completed (Perkins 1999b). The sediment management plan further proposes to refine estimates of the total amount and composition of gravel required to restore coarse sediment transport downstream of Howard Hanson Dam by sampling of delta deposits in Howard Hanson Reservoir and development of a sediment budget for the Green River upstream of RM 32. The transport capacity downstream of Howard Hanson Dam will be analyzed with a hydraulic prediction model to ensure that gravel placement does not result in excessive aggradation that could fill pools, hinder fish passage, or compromise flood control in the Middle Green River. Effectiveness monitoring will be conducted by the USACE under the Section 7 Consultation Process and Green-Duwamish General Investigation study.

21. Instream flows should be increased to provide additional recreational opportunity, and impacts to recreation should be mitigated.

The instream flow package identified in the HCP has been developed primarily with the intent of protecting fisheries resources on the Green River while still allowing the continued operation of Tacoma's water supply. Some late-spring recreational opportunities would be enhanced by the instream flows provided; however, there would be a reduction in the number of boating days in the late winter and early spring period. Changing the beginning of water storage at Howard Hanson Dam to February rather than later in the spring would provide more whitewater boating days later in the spring than are currently available. It is Tacoma's understanding that late spring boating days are preferred by most whitewater enthusiasts due to warmer air and water temperatures.

In 1995 Tacoma signed a mitigation agreement with Friends of the Green River, a group heavily involved in whitewater recreation on the Green River. This agreement covers water withdrawals of both the First Diversion Water Right claim and Second Diversion Water Right. Although this agreement did not include the Additional Water Storage Project, one objective of the Additional Water Storage Project is to store water available to Tacoma under the Second Diversion Water Right. There is no additional water diverted to storage behind Howard Hanson Dam as part of the Additional Water Storage Project than Tacoma could have diverted under the Second Diversion Water Right, which is covered by the agreement with Friends of the Green River. The Additional Water Storage Project stores water diverted under the Second Diversion Water Right during the late winter and early spring, thus reducing Tacoma's need to divert water during the more popular late spring boating season. In its present configuration, Tacoma's operation under the HCP would

enhance whitewater recreation opportunities as compared to previous operations covered in Tacoma's mitigation agreement with Friends of the Green River.

22. Tacoma Water should be required to ladder Howard Hanson Dam to provide upstream passage of adult salmonids and should not be allowed to truck fish around the dam.

Under Tacoma's proposed conservation measure (HCM 1-03), adult fish would be collected downstream of the Tacoma Headworks at RM 61.0 and released at the upstream extent of the Howard Hanson Dam reservoir in the vicinity of RM 72.0. The proposed upstream fish passage facility includes a fish ladder over the 23.5-foot high, modified Tacoma Headworks diversion combined with a trap-and-haul operation from the Headworks Dam to above the 235-foot-high Howard Hanson Dam. A trap-and-haul was selected as the preferred design for the upstream fish passage facility at Howard Hanson Dam because of serious concerns regarding the applicability of conventional fish ladder technology to Howard Hanson Dam. The selection of a trap-and-haul facility to pass adult fish over Howard Hanson Dam represents the best available solution to satisfy site conditions with the greatest likelihood of success.

A fish ladder commonly consists of a series of pools in steps around the barrier, with water flowing from pool to pool. The fish ascend the ladder by jumping or swimming upstream from pool to pool. A trap-and-haul facility consists of a short fish ladder leading to a holding area where fish are moved into a tank of water, trucked upstream above the barrier, and released into the river via a short chute. Newer trap-and-haul facilities provide water-to-water transfer and no direct handling of fish. The selection of a preferred type of upstream fish passage facility at a barrier considers a variety of factors including: height of the barrier, probable fluctuations in water level upstream and downstream of the barrier, the quantity of water available, fish stock management needs, and past record of experience.

Fish ladders are generally deemed a more natural solution than trap-and-haul facilities. Fish passing through fish ladders can move upstream on their own volition and require less human intervention to surmount the barrier. Fish ladders are commonly used where the water level of the upstream and downstream entrances can be controlled and where barriers are less than about 100 feet in height. Fish ladders require the water level in the pool immediately upstream of the barrier to fluctuate less than about 20 feet. Although greater ranges are theoretically possible, the greatest range of fluctuation noted in a review of fish ladder technology is a fish ladder at Hell's Gate Canyon on the Fraser River in British Columbia (Clay 1995). The Hell's Gate fish ladder is designed to operate

with up to a 45-foot fluctuation in the upstream pool. Since Howard Hanson Dam is used to alternately store and release water during the flood control season, the water level behind the dam can fluctuate well over 100 feet during October through December. During times when the reservoir pool is low, fish that ascended a ladder over Howard Hanson Dam would need to be lowered to the upstream pool level in a high velocity chute or via some type of mechanical elevator. In addition, water flowing into the fish ladder would have to be continuously pumped from the low reservoir pool.

As an alternative to returning fish to the low pool level through a slide or chute, the fishway could be extended approximately 7 miles to the upstream end of the reservoir. This extension would be in addition to the length of ladder needed to reach the crest of the 235-foot-high Howard Hanson Dam. Fish ladders over 1 mile in length are uncommon because of water temperature concerns, habitat conditions within the ladder, and cost. Water flowing through a fish ladder must be cold enough to sustain salmonids and must exit with a water temperature similar to the water in the downstream river channel. If the water flowing out of the fish ladder is much warmer than the downstream river water, adult fish may be confused and unable to find, or may be unwilling to enter, the fish ladder. Fish transit times through fish ladders should be less than about 6 hours according to draft Washington State guidelines, which effectively limits the maximum height of a fish ladder to about 90 feet (Bates, pers. comm., 24 May 2000).

Trap-and-haul facilities are generally regarded as less desirable than fish ladders when passing fish over small barriers because of increased handling, stress, and non-volitional fish movement (Duke Engineering & Services 1999). Trap-and-haul facilities are generally preferred where the upstream reservoir pool fluctuates or where the height of the barrier exceeds 100 feet or more. Trap-and-haul is often the preferred facility for management of mixed species, especially where upriver stocks are to be separated from downriver stocks, or where species listed under the ESA are co-mingled with hatchery stocks.

Trap-and-haul technology is successfully being employed in the Pacific Northwest at a variety of sites containing high barriers or where the upstream pool level fluctuates. For example:

- A trap-and-haul program has been operated at the Baker River Hydroelectric Project by Puget Sound Energy since 1925. In recent years, annual returns of nearly 15,000 adult salmon and steelhead have been passed upstream of the Upper and Lower Baker dams. The Upper Baker Dam is 330 feet high and the Lower Baker Dam is

approximately 285 feet high.

- The WDFW has operated a trap-and-haul program at Sunset Falls on the South Fork Skykomish River since the mid-1950s. The Sunset Falls trap-and-haul facility is used to pass an average of 15,000 adult salmon and steelhead over three natural waterfalls (28 feet, 48 feet, and 88 feet high).

- A trap-and-haul program has been operated by the USACE to pass an average of approximately 6,000 adult salmon and steelhead over the 425-foot-high Mud Mountain Dam on the White River since 1948. Similar to Howard Hanson Dam, the Mud Mountain Dam is operated to provide flood control, and the reservoir pool fluctuates during flood control season.

- The USACE has operated a trap-and-haul program on the Wynoochee River since the late 1960s. The facility is used to pass an average of approximately 2,500 adult salmon and steelhead over the 177-foot-high Wynoochee Dam.

Several commenters to the HCP and DEIS contested the statement that fish ladders are not generally preferred to pass adult salmon over barriers over 100 feet high. They referred to the Clackamas River Project in Oregon and the Cowlitz River Project in Washington as locations where fish ladders were either in operation or were being considered to provide upstream fish passage at high dams.

The Clackamas River Project in Oregon consists of four separate hydroelectric developments:

- The Oak Grove Development was constructed upstream of a natural barrier and does not have upstream fish passage facilities.

- The Faraday-North Fork fish ladder provides upstream fish passage around the North Fork and Faraday Developments. The North Fork Development includes a 1.9-mile-long fish ladder with its entrance below the Faraday Diversion Dam and rising 196 feet to an exit-entrance into the North Fork Reservoir above the North Fork Dam. At the time of construction, the Faraday-North Fork fish ladder was the longest operating fish ladder in the world. The 1.9-mile-long fish ladder at the North Fork Development was designed to provide adult fish direct access to the reservoir throughout an operating range of 19 feet change in water surface fluctuation.

Although the height of the Faraday-North Fork barrier is 196 feet (compared to the 235-foot Howard Hanson Dam), the magnitude of water level fluctuations in the forebay is the most significant difference between the Faraday-North Fork fish ladder and Howard Hanson Dam. The North Fork reservoir forebay fluctuates only 19 feet compared to the Howard Hanson Dam forebay fluctuation of well over 100 feet. In addition, the Faraday-North Fork ladder has not been completely successful. In response to observed delays in upstream fish passage of chinook salmon through the ladder, a trap was added near the base of the ladder, and fish are also trucked and released upstream.

- The River Mill fish ladder was constructed in 1912 at the River Mill Development to provide adult fish passage over the 85-feet-high River Mill Dam directly into Estacada Lake. The concrete fish ladder steps up the face of the dam in a series of right-angle turns. The River Mill Project is operated as a run-of-river facility with typically less than 10 feet of fluctuation in the upstream reservoir level. Howard Hanson Dam is more than 2.7 times higher than the River Mill Dam, and Howard Hanson Dam forebay fluctuations are much greater than the 10-foot fluctuations experienced at the River Mill Dam. The River Mill fish ladder is considered by some to be too steep and small to facilitate upstream fish passage, and modifications are planned as part of federal relicensing of the project (Portland General Electric 1999).

A fish ladder is currently being considered to pass adult salmonids over the 182-foot-high Mayfield Dam on the Cowlitz River. High water temperatures at the upstream reservoir surface are one of several hurdles that must be overcome before a fish ladder will be attempted as an upstream fish passage facility over Mayfield Dam. One critical site difference between Mayfield Dam and Howard Hanson Dam is that the Mayfield reservoir pool level is held relatively constant. The Mayfield reservoir fluctuates less than approximately 10 feet while Howard Hanson Dam can fluctuate more than 100 feet during the fall salmon migration season.

The extreme water level fluctuation of the Howard Hanson reservoir pool, the height of Howard Hanson Dam, the desire to potentially separate out fish stocks, and water quality concerns are all factors that support the selection of a trap-and-haul as the preferred upstream fish passage facility at Howard Hanson Dam. While a fish ladder would provide volitional passage of adult salmonids, the Services believe use of a fish ladder to pass adult salmon and steelhead above Howard Hanson

Dam would be impractical given the site constraints. Use of a fish ladder at Howard Hanson Dam would involve greater risk of delayed or interrupted passage and injury to returning adult salmonids than a trap-and-haul facility.

23. Tacoma Water must be required to guarantee the restoration of naturally reproducing populations of anadromous fish above Howard Hanson Dam.

As stated earlier in General Comment Response 3, Tacoma Water is required to meet the issuance criteria under Section 10(a)(2)(B) of the ESA. Tacoma cannot be held responsible for recovery of anadromous salmon stocks in the Green River. Several factors have contributed to declines of salmonid stocks in the Green River, some of which Tacoma has influence over and some of which it does not. For example, Tacoma has addressed the interruption of fish passage at its headworks facility and is working closely with the USACE and resource agencies to address downstream passage of juvenile fish at Howard Hanson Dam. On the other hand, it has less control over the loss of riparian habitats in the middle and lower Green River and over the management of flood control structures in the Auburn Valley.

With this in mind, the restoration of anadromous fish in the Green River is of utmost concern to the Services and has been the focus of Tacoma's HCP effort. Many of the conservation measures Tacoma has committed to in the HCP are geared toward the restoration of anadromous fish both above and below Howard Hanson Dam. The Services expect these commitments by Tacoma to contribute to the recovery of anadromous stocks in the Green River, but we also recognize that the recovery of these stocks to fishable numbers is the responsibility of all users of the Green River and Green River Watershed.

24. Spawning and protective shore habitat in the Green River should be restored and preserved.

Of the 66 Habitat Conservation Measures proposed in Tacoma's HCP, 27 (41%) have been designed specifically to preserve and restore spawning and shoreline habitat in the Green River:

HCM 1-01 Minimum instream flows under the First Diversion Water Right claim
HCM 1-02 Seasonal restrictions on the Second Diversion Water Right
HCM 1-05 Tacoma Headworks large woody debris/rootwad placement
HCM 2-02 Howard Hanson Dam non-dedicated storage and flow management

HCM 2-03	Upper watershed stream, wetland, and reservoir shoreline rehabilitation
HCM 2-04	Standing timber retention
HCM 2-06	Low flow augmentation
HCM 2-07	Side channel reconnection at Signani Slough
HCM 2-08	Downstream woody debris management
HCM 2-09	Mainstem gravel nourishment
HCM 2-10	Headwater stream rehabilitation
HCM 3-01A	Upland forest management zones
HCM 3-01B	Natural Zone
HCM 3-01C	Conservation Zone
HCM 3-01K	Contractor and logger awareness
HCM 3-01M	Reforestation
HCM 3-01N	Harvest limitations on unstable slopes
HCM 3-02A	No-harvest riparian buffers
HCM 3-03A	Watershed Analysis
HCM 3-03B	Road maintenance
HCM 3-03C	Road construction limitations on unstable landforms
HCM 3-03D	Road restrictions on side slopes greater than 60 percent
HCM 3-03E	Erosion control
HCM 3-03F	Stream crossings
HCM 3-03H	Roadside vegetation
HCM 3-03I	Road abandonment
HCM 3-03J	Culvert improvements

Four measures (HCMs 1-01, 1-02, 2-02, 2-06) address protecting flows for salmonids while balancing the municipal water supply needs of Pierce and South King Counties. Three measures (HCMs 1-05, 2-08, 2-09) address the restoration of wood and gravel to the mainstem river to provide structure and substrate to improve rearing and spawning habitat, and the remaining 20 measures (HCMs 2-03, 2-04, 2-07, 2-10, 3-01A, 3-01B, 3-01C, 3-01K, 3-01M, 3-01N, 3-02A, 3-03A, 3-03B, 3-03C, 3-03D, 3-03E, 3-03F, 3-03H, 3-03I, 3-03J) address protection or restoration of shoreline and riparian areas from degradation caused by human activities. The Services believe these measures would contribute to the restoration and preservation of salmon habitat in the Green River.

In addition to committing to the 27 Habitat Conservation Measures listed above, Tacoma Water is working with the USACE and WRIA 9 Salmon Recovery workgroups. In the WRIA 9 initiative,

Tacoma participates on both policy (Steering) and technical (Planning, Factors of Decline) committees of the King County-sponsored planning effort. This planning effort is evolving and is expected to become the focus for fish and wildlife protection, restoration, and project coordination efforts.

25. The Habitat Conservation Plan lacks quantifiable data and resource objectives.

The Services recognize two different types of HCPs; outcome-based HCPs, and prescription or conservation measure-based HCPs. With an outcome-based HCP, the Services and applicant agree to a set of biological outcomes as the commitments of the permit holder. With conservation measure-based HCPs, the Services and applicant negotiate specific measures, for example minimum instream flow during the summer, that are designed to produce certain habitat attributes or species responses.

Outcome-based management responds to ecosystem conditions and defines limits to acceptable resource damage. In the outcome-based HCPs, the Services believe that quantifiable goals and objectives must be clearly articulated, or we have no recourse for determining non-compliance during permit implementation. This type of management is considered reactive rather than preventative, since actions are modified only after degradation has occurred to levels beyond which further degradation is considered unacceptable (Bauer and Ralph 1999).

In contrast, conservation measure-based HCPs, such as the Tacoma Water HCP, rely less on numeric goals and objectives because the legal commitments made by the landowner are the conservation measures, and not the outcomes of these measures. Conservation measure-based management implies a preventative approach based on modifying management actions to reduce or preclude adverse environmental impacts (Bauer and Ralph 1999). Compliance with specified conservation measures thus becomes the primary focus of monitoring. The Services encourage the reader to review HCM 2-02 in HCP Chapter 6 and General Comment Response 26 for more specific information on the role of adaptive management in the Tacoma HCP.

26. The adaptive management provisions identified in the Habitat Conservation Plan must allow adjustments to the rate of municipal water storage and withdrawal if monitoring identifies additional impacts to fish and wildlife resources.

Adaptive management provisions do allow flow management changes within limits defined in Chapter 5 of the HCP. The flow management measures include constraints on Tacoma's existing First and Second Diversion water rights, phased implementation of additional storage, and funding support for flow augmentation to benefit instream resources. While the adaptive management provisions identified in the HCP allow increased flow adjustments to benefit fish and wildlife resources relative to baseline conditions, the limits of flow adjustment are defined to provide Tacoma Water the certainty it requires to provide municipal water to its customers.

Allowable adjustments to the rate of USACE water storage and Tacoma withdrawals are seasonal in nature. During the winter, water storage behind Howard Hanson Dam is dedicated to flood control, and there is little or no opportunity to augment flows. Restrictions on Tacoma's ability to withdraw water during the winter were developed during hearings on the Second Diversion Water Right during the early 1980s, and the 1995 MIT/TPU Settlement Agreement that constrained water withdrawals under the Second Diversion Water Right beyond state instream flow requirements.

During the spring months, the rate of water storage and release at Howard Hanson Dam will be adaptively managed to reflect annual and mid-season recommendations by the Green River Flow Management Committee (HCM 2-02). The Committee is expected to recommend adjustments to the rate of water storage and release based on results of the extensive monitoring program described in Chapter 6 of the HCP. The Committee has only two main constraints on adjusting the rate of water storage and release. Committee recommendations cannot interfere with USACE flood control responsibilities and, by the end of the spring refill period, the volume of water available to Tacoma Water under the Second Diversion Water Right must be stored and dedicated to municipal use (i.e., about 5 percent of the inflow to Howard Hanson Dam during average spring runoff conditions). The addition of the large volume downstream fish passage facility to Howard Hanson Dam provides the Flow Committee great latitude in adapting flow recommendations, and the extensive monitoring described in Chapter 6 would provide valuable feedback to the Committee on results of its flow management efforts.

Tacoma's withdrawal of water during the summer months are constrained by restrictions on the Second Diversion Water Right established in 1980 (173-509 WAC), which were affirmed by the

Pollution Control Hearings Board in 1981, and further constrained by a stipulated judgment in a 1983 Superior Court case. The 1995 MIT/TPU Settlement Agreement placed additional constraints on the Second Diversion Water Right and placed constraints on Tacoma's First Diversion Water Right claim. During the summer months, up to 5,000 acre-feet of water stored behind Howard Hanson Dam for fisheries purposes (HCM 2-06) are available for discretionary release to benefit fisheries resources. The Green River Flow Management Committee will make recommendations on the timing and quantity of releases, and the results will be monitored through measures described in Chapter 6 of the HCP. There are typically no USACE flood control requirements during the summer months, and the Green River Flow Management Committee has latitude to store or pass natural summer freshets or otherwise adjust flows based on results of the monitoring program.

The fall months may represent the greatest limitation on Tacoma's ability to balance water withdrawals for municipal use with instream fisheries protection. During extreme fall drought conditions, low instream flows will impact instream resources and could affect the number of adult salmon returns for several years. Tacoma's guaranteed minimum flow of 225 cfs at Auburn, associated with the 1995 MIT/TPU Settlement Agreement, is effective through mid-September and is not effective during October drought conditions. However, under the conservation measures described in Chapter 5, Tacoma would not be able to withdraw water under its Second Diversion Water Right during a fall drought. During fall drought conditions, Tacoma Water anticipates using water stored during spring months to meet demands for municipal water supply.

During drought conditions, Tacoma Water would convene a drought coordination meeting and seek to institute consensus-derived water use restrictions (HCM 1-01). Even with restrictions on Tacoma's water withdrawals, extreme low flows in the Green River would impact fish and other instream resources. The 5,000 acre-feet of discretionary water may not be sufficient to avoid the long-term impacts of extreme drought conditions. In recent years, Tacoma has voluntarily responded to requests for additional water by curtailing withdrawals, or by using water from groundwater wells to provide additional fisheries protection. Opportunities to increase the level of instream resource protection while meeting municipal water supply needs would be explored through the drought coordination commitments identified in HCM 1-01. The Services expect that Tacoma Water would continue to voluntarily cooperate with future efforts to increase the level of instream resource protection while meeting its responsibility to continue to provide safe, clean municipal water. It is important to note that the Services will not consider Tacoma's voluntary measures when deliberating issuance of an ITP.

27. Instream flows should reflect natural flow variation rather than base or minimum flow requirements.

The integrity of rivers depends largely on their natural dynamic character (Poff et al. 1997). The natural dynamic character of the Green River has been influenced by the desire to control flooding and otherwise manage the Green River for the benefit of mankind. Tacoma's withdrawal of water from the Green River for municipal use represents another man-induced impact on the natural flow variability of the river. Conservation measures identified in Tacoma Water's HCP have been designed to constrain Tacoma's withdrawal of water during extreme low flow events, and to provide the opportunity to restore a measure of natural variation to Green River flows.

In describing the ecological functions of the various components of a natural flow regime, the high and low flow events are often stressed because they may serve as ecological "bottlenecks" (Poff and Ward 1990). High flow events control the dynamic equilibrium between the movement of water and the movement of sediment in free-flowing rivers. High flow events also maintain the linkages between mainstem, side channel, and floodplain habitats. High flow events in the Green River are controlled by the USACE's mandate to reduce flooding in the lower Green River valley and will be addressed through ESA Section 7 consultation with the Services. These consultations are separate from, and outside the scope of this HCP.

Low flow events in the Green River are directly influenced by Tacoma's water withdrawals. Low flow events influence the production of salmonids that rear year-round in river systems, and were closely scrutinized during development of Tacoma's conservation measures. Tacoma's instream flow measures serve to reduce the effects of water withdrawals during the summer low flow period and guarantee that flows would not drop to historical extremes. For instance, the lowest 7-day low flow period in a 32-year record of modeled natural flows between mid-July and mid-September was 203 cfs at Auburn. Under the proposed conservation measures, flow in the Green River at Auburn between mid-July and mid-September would not drop below 225 cfs.

Tacoma's ability to alter the Green River flow regime is limited to its withdrawal of up to 213 cfs. In the absence of Tacoma's withdrawals and flow adjustments by the USACE, the average daily flow of the Green River at Auburn between 1963 and 1995 was estimated to be 1,414 cfs (CH2M Hill 1997). Assuming Tacoma withdraws a maximum 213 cfs, Tacoma's withdrawals represent about 14 percent of the average daily flow in the Green River at Auburn. During high flow conditions, Tacoma's withdrawals represent a small percentage of the Green River flow at Auburn;

while during low flow conditions, Tacoma's withdrawals represent a large percentage of the Green River flow. Not surprisingly, several of Tacoma's conservation measures focus on resource protection during low flow periods when Tacoma's withdrawals may represent a large percentage of flow in the Green River. However, as previously noted, the ecological integrity of a river cannot be maintained by minimum flows alone. The increased opportunity to manage a range of flow releases was integral to developing a successful conservation plan and constitutes a major improvement over past management of the river.

Several of the conservation measures in Tacoma's HCP provide natural resource agencies and tribes, through the Green River Flow Management Committee, additional opportunity to manage flows in the Green River to reflect natural flow variations. The USACE has altered the natural flow regime of the Green River by reducing the magnitude of flood flows and by its past strategies of storing water for low flow augmentation (see discussion of HCM 2-02 in the HCP). Although the USACE has recently modified its refill strategy, the USACE's ability to manage flows during spring refill while simultaneously providing safe downstream passage for outmigrating salmonids is limited by the lack of a downstream fish passage facility. Tacoma's contribution to the addition of a high volume downstream fish passage facility at Howard Hanson Dam (HCM 2-01) provides greater opportunity to manage flows in the Green River to reflect natural flow variation. The development of a program to track the volume of stored water dedicated to municipal use and the volume available for managing instream flows (HCM 2-02) gives the Green River Flow Management Committee a valuable tool for managing flows in the Green River. Tacoma Water's contribution to up to 5,000 acre-feet of additional water available for managing instream flows (HCM 2-06) also provides the Green River Flow Management Committee additional flexibility to manage flows to benefit instream resources. Tacoma is funding extensive monitoring (HCP Chapter 6) that will provide resource agencies and tribes, through the Green River Flow Management Committee, valuable feedback to determine if its recommendations have the desired effects.

During recent years, at the request of the Green River Flow Management Committee, the USACE has incorporated a *proportional capture* process for meeting water storage requirements at Howard Hanson Dam. The USACE refills the reservoir by storing a percentage, or capturing a proportion, of the inflow. Based on measurements of the snowpack level, predicted precipitation patterns, start of refill, and desired refill completion date, the USACE stores between 10 and 15 percent of the inflow. During 1999, the USACE initiated refill on 1 April and implemented a target refill rate of 15 percent of inflow to meet the storage target of 29,200 acre-feet. During Phase 1 of the Additional Water Storage Project, up to an additional 20,000 acre-feet of water will be stored, but refill will

begin in mid-February. During an average spring, approximately 13 percent of the inflow will be needed to meet the Phase 1 Additional Water Storage target of 49,200 acre-feet.

Implementing a refill strategy that captures a proportion of the natural hydrology restores a measure of flow variability important to natural ecosystem functions. Strictly following a proportional capture regime however, may provide uncertain benefits and potential adverse impacts if applied during extreme low flow events. Many geomorphic and ecological processes show nonlinear responses to flow (Poff et al. 1997), and flow management regimes may have unintended consequences when applied to systems altered by man. Incorporating a proportional capture regime, capturing or releasing freshets, or increasing the rate of capture during high flow periods are all management options available to the Green River Flow Management Committee. The risk of unintended consequences is the primary rationale for the extensive monitoring program described in Chapter 6 of the HCP. The monitoring and adaptive management provisions provide a mechanism for adjusting flows, albeit within limits defined in Chapter 5 of the HCP.

28. Use of the 'best available science', a federal Endangered Species Act requirement, was not incorporated in Tacoma's analyses of impacts in the Habitat Conservation Plan.

Any HCP must use "the best scientific and commercial data available to identify potential impacts to the endangered species and to incorporate the most effective use of research and technology to monitor, minimize, and mitigate such impacts" (50-CFR 222.22; 50 CFR 17.22 and 17.32). To assure the quality of the biological, ecological, and other information used in the implementation of the ESA (Act), it is the policy of the Services to: evaluate all scientific and other information used to ensure that it is reliable, credible, and represents the best scientific and commercial data available; gather and impartially evaluate biological, ecological, and other information disputing official positions, decisions, and actions proposed or taken by the Services; document their evaluation of comprehensive, technical information regarding the status and habitat requirements for a species throughout its range, whether it supports or does not support a position being proposed as an official agency position; use primary and original sources of information as the basis for recommendations; retain these sources referenced in the official document as part of the administrative record supporting an action; collect, evaluate, and complete all reviews of biological, ecological, and other relevant information within the schedules established by the Act, appropriate regulations, and applicable policies; and require management-level review of documents developed and drafted by Service biologists to verify and assure the quality of the science used to establish official positions, decisions, and actions taken by the Services during their implementation of the Act (59 FR 34271).

The scientific information used to develop the conservation measures in Tacoma Water's HCP was developed from studies that were scoped, conducted, and reviewed by scientists from federal, state, and tribal organizations. The Habitat Conservation Measures pertaining to instream flows were developed from research conducted by Ecology and reported in its report on *Green River Fish Habitat Analysis Using the Instream Flow Incremental Methodology* (Caldwell and Hirschey 1989). This study was developed in conjunction with biologists and other participants representing the NMFS, USFWS, Muckleshoot Indian Tribe, WDFW, Washington Department of Wildlife, USACE, Tacoma Water, and Trout Unlimited.

A number of HCMs were constructed from information developed to assess the environmental impacts of the Additional Water Storage Project. Since the inception of the Additional Water Storage Project in 1989, Tacoma Water and the USACE have conducted ongoing, regular meetings with all fish and wildlife resource agencies and the Muckleshoot Indian Tribe to develop and refine water supply, restoration, and mitigation alternatives for the project. Throughout the entire reconnaissance and feasibility processes, these representatives interacted directly with Tacoma Water and the USACE in shaping the scale, components, and details of each of the Additional Water Storage Project features.

Habitat Conservation Measures pertaining to downstream fish passage were developed from a large body of research on fish passage conducted in the Pacific Northwest, including several studies conducted by the WDFW and the USFWS on the success of salmon and steelhead juvenile passage through Howard Hanson Dam and Reservoir. In 1989, a Fish Passage Technical Committee was convened by Tacoma Water and the USACE to provide a report on juvenile fish passage facility options for Howard Hanson Dam that could be considered in greater detail by the USACE during the feasibility study for the Additional Water Storage Project. The Committee consisted of five experts nominated by federal and state fisheries agencies, the Muckleshoot Indian Tribe, and Tacoma. The Committee published its report in January 1990. In 1992 the Committee was reactivated to assist in developing, evaluating, and selecting a feasibility level fish passage concept for the proposed project. In 1996 the Committee provided final input in evaluating and selecting among the final fish passage alternatives.

The Fish Passage Technical Committee report also provided a framework for developing baseline studies to assess the existing state of downstream fish passage at Howard Hanson Dam. A series of baseline interagency monitoring studies were subsequently initiated in 1990 by the USFWS, WDFW, the Muckleshoot Indian Tribe, USACE, and Tacoma Water, and are scheduled to continue through the year 2000.

In addition to fish passage studies, Tacoma and the USACE also funded the USFWS to study other potential Additional Water Storage Project impacts to fish. In 1992 the USFWS reported its findings on the potential effects of inundating tributary habitat by the increased pool. In 1993 the USFWS published a report on the vertical distribution of juvenile salmonids in the forebay behind Howard Hanson Dam. Results of this study have been used in development of the downstream passage facility at Howard Hanson Dam. In 1994 the USFWS published a report on the horizontal and vertical distribution of juvenile salmonids in the reservoir, and in 1996, the USFWS published its findings on the travel time of coho salmon and steelhead smolts emigrating through the reservoir. Between 1996 and 1999 the USFWS published three progress reports on the rate of returning adult coho and chinook tagged and released above and below the Howard Hanson Dam in 1994 through 1997. The last of the adult fish tagged as part of this study are expected to return in the fall of 2000.

Initial scoping for the Environmental Impact Statement for the Additional Water Storage Project was conducted in 1991 (Federal Register Notice of Intent published January 25, 1991) but was essentially suspended while the above referenced studies were conducted. Scoping was reinitiated in 1996 with a second Notice of Intent to prepare an Environmental Impact Statement published in the Federal Register on July 9, 1996. Public comment was sought in accordance with regulatory procedures, and a public scoping meeting was held in Auburn on July 18, 1996.

As a result of the comments received in the scoping process, additional studies were undertaken. A study of the juvenile use of lateral stream habitats in the middle Green River was initiated in February 1998 based on physical data collected by Coccoli (1996) and Madsen and Hilgert (1997). The study was conducted during the fall of 1996 and the spring of 1998, 1999, and 2000. In the spring of 2000, a screw trap was installed and operated by WDFW in the middle Green River to document the existing characteristics of outmigrating juvenile salmonids. The study is expected to continue for several years to gather information on seasonal and diel movement, response to environmental changes (flow, turbidity, day length, temperature), and observed responses during Howard Hanson Dam refill and release.

Upland Forest Management conservation measures were developed from DNR Watershed Analyses conducted in the Lester, Upper Green Headwaters/Sunday Creek, and Howard Hanson/Smay Creek Watershed Analysis Units; the U.S. Forest Service's Northwest Forest Plan; the Forests and Fish Report; the DNR Forest Practices Rules; other approved HCPs in the watershed; and a Forest Inventory/GIS of Tacoma Water lands. Species-specific management measures were developed from recommendations made by the USFWS and WDFW based upon their own and others' research and experience in working with these species.

The Services have carefully considered all the factors noted above and believe that the information presented in the HCP does represent the best scientific and commercial data available. In addition, information contained within several of the public comments supplements the existing record and will also be considered by the Services during their ESA determinations. Based on the current record, the Services do not believe there are areas of great scientific uncertainty that would require an independent scientific review of the proposed conservation measures beyond what has been received during scoping and public review. This assessment by the Services will continue to be reviewed as the Biological Opinions and § 10(a)(2)(B) Findings are prepared.

29. The direct and indirect effects of Tacoma Water's proposed water withdrawals on future urban growth must be clearly analyzed in the Environmental Impact Statement.

The Services interpret that the various commenters' underlying concerns relate to the impact of urban growth on the human environment. While urban growth will occur, an analysis of the impact of urban growth is outside the scope of this DEIS and has been more appropriately addressed through other regional and statewide planning efforts.

As stated in subsection 1.6.5 of the DEIS, the distribution of growth in the state of Washington is managed under the Growth Management Act (GMA). The development of Growth Management Plans are required for many counties and allowed for in other counties under the Revised Code of Washington, Chapter 36.70.

Under the GMA, growth is projected by the state's Office of Fiscal Management and is allocated to the counties. The counties use these allocations to develop their Growth Management Plans and to address projected population increase and associated needs for services. Both counties and cities may plan under the Growth Management Act. Plans developed under the GMA guide zoning and development permits within the jurisdictional boundaries of the plans. In the state of Washington, therefore, distribution of water does not induce or lead to growth, but rather responds to the growth needs previously identified through a statewide process and specifically allocated by local government planning under the GMA.

In the case of Tacoma Water's service area, GMA Plans have been developed by Pierce County, the City of Tacoma, King County, the City of Seattle, and a number of other cities in King County. These plans forecast and direct urban growth within Tacoma Water's service area. The service of water from the Green River by Tacoma, therefore, appropriately responds to the growth-related

service requirements identified by the GMA. Furthermore, local, county, and state ordinances, including those regulating future growth, are currently being reviewed and updated to ensure they comply with Section 4(d) take prohibitions or meet the standards required for exemption under the Section 4(d) limit published in July 2000.

30. The cumulative impacts analyses in the Environmental Impact Statement should include related projects such as the Green River Second Supply Project and the Additional Water Storage Project.

The cumulative effects analysis in the DEIS has been expanded to include a more comprehensive discussion of other federal, state, and local/private programs, proceesses, and projects that have the potential to interact with the proposed action to affect listed species in a cumulative manner.

Two such projects include the USACE's Additional Water Storage Project, and the Green River Second Supply Project. These are separate and distinct from the Tacoma Water proposed HCP, but both are related. The Additional Water Storage Project is separate and distinct because it could take place regardless of whether Tacoma Water obtains an ITP. The Additional Water Storage Project is related in that it is intended to provide additional capacity to store flood water behind the USACE's Howard Hanson Dam. Since the additional flood water storage capacity will not be needed in the summer, this additional storage capacity will make it possible for Tacoma to make use of additional water from the Green River during that time. The potential impacts of the additional storage and the resulting need for mitigation will be addressed in an ESA consultation between the Services and the USACE. The impacts of the additional water withdrawal are already addressed in subsection 4.2, Water Withdrawal Alternatives, of this EIS.

The Second Supply Project is separate and distinct because it could be constructed and operated regardless of whether or not Tacoma Water obtains an ITP for its operations in the Upper Green River Watershed. The Second Supply Project is related in that it involves the construction and operation of an additional water supply pipeline originating at Tacoma's Headworks. The potential impacts of the construction and operation of the new pipeline and the resulting need for mitigation will be addressed through a separate State Environmental Policy Act EIS. The impacts of the additional water withdrawal are already addressed in subsection 4.2, Water Withdrawal Alternatives, of this EIS.

31. The comment period for the DEIS/HCP should have been extended.

The Services did extend the comment period in direct response to public requests. The original comment period was 60 days. The extension added 17 days, resulting in a 77-day comment period. The Services believe this falls within the following direction from the Services' 5-Point Policy for HCPs, "The public review period for large, complex HCPs is 90 days, unless there is significant public involvement during development. All other HCPs (including large complex HCPs with significant public involvement) will be made available for review and comment for a minimum of 60 days" (65 FR 35241).

Extensive public involvement occurred throughout the development of this proposed action. The public involvement included: substantial outreach by Tacoma Water, which involved numerous meetings with tribes, state agencies, and special interest groups, and distribution of a newsletter to interested parties; a 30-day scoping period during which written comments were solicited from interested parties, and one scoping meeting was held; a 77-day comment period for the draft documents during which written comments were solicited from interested parties, and three public meetings were held; and the final 30-day review period following issuance of final documents. The 30-day scoping period, 77-day comment period, and 30-day review period were each announced in Federal Register notices, "interested party" letters, and press releases.

ATTACHMENT A

FPA #2405693 State of Washington
Received: 01/29/1999 Dept of Natural Resources Classified: CLASS III-30
Decision Date: 02/22/1999 DECISION ACTIVITY PACKET
Expiration Date: 02/22/2001

Risk Assessment Issue: Timber harv w/in or across type 1-3 stream or RMZ
Risk Assessment Issue: Timber harv within 25 feet of type 4-5 water

Legal: SESW of Section 7; T20R09E W.M.
Legal: SESE of Section 8; T20R09E W.M.
Legal: SWSE of Section 9; T20R09E W.M.
Legal: NWNW of Section 16; T20R09E W.M.
County: KING
Region: SOUTH PUGET SOUND Assigned to: CYRIL MOYA

Operator: Phone: (360) 825-8176
WEYERHAEUSER COMPANY CASCADE OPERATIONS
31002 CHINOOK PASS HWY
ENUMCLAW WA 98022
UBI: 278012337 Corporation

Landowner: Phone: (360) 825-8176
WEYERHAEUSER COMPANY CASCADE OPERATIONS
31002 CHINOOK PASS HWY
ENUMCLAW WA 98022
UBI: 278012337 Corporation

Timber Owner: Phone: (360) 825-8176
WEYERHAEUSER COMPANY CASCADE OPERATIONS
31002 CHINOOK PASS HWY
ENUMCLAW WA 98022
UBI: 278012337 Corporation Ttax#: 800005344

This application is | APPROVED | subject to the following:

Activity under this application must follow current Washington State Forest Practice Rules and Regulations.

Compliance with this application does not ensure compliance with the Endangered Species Act or other Federal, State or Local laws.

?PAN-2405693 Conditions

HYDRAULIC PROJECT APPROVAL MAY BE REQUIRED.

This decision may be appealed under WAC 222-08-010 by contacting the DNR Regional office listed above or calling 1-800-527-3305.

FPA #2405693
Received: 01/29/1999
Decision Date: 02/22/1999
Expiration Date: 02/22/2001

State of Washington
Dept of Natural Resources
DECISION ACTIVITY PACKET

Classified: CLASS III-30

TRAXS Flag: Water rights reported by Dept. of Ecology
TRAXS Flag: DFW Endangered/Threatened Animal

Within city limits?	NO
Harvest within 500 ft of park?	NO
Harvest within park?	NO
Land platted after 1/1/60?	NO
Intends to convert w/in 3 years?	NO
Has Conversion Option Harvest Plan?	NO

WATER AND WETLAND INFORMATION SECTION

Works in Waters	Water Type 1	2	3	4	5	Wetlands Type Forested	A	B
Road Construction	.	.	3	4	5	.	.	.
Water Crossing	.	.	.	.	.	.	.	.
Falling / Bucking	.	.	.	.	.	.	.	.
Cable Yarding	.	.	.	.	.	.	.	.
Suspend Cables	.	.	.	.	.	.	.	.
Ground Skidding	.	.	.	.	.	.	.	.
Operate Equipment	.	.	.	.	.	.	.	.
Apply Chemicals	.	.	.	.	.	.	.	.
Other Activity	.	.	.	.	.	.	.	.

Operating w/in 200 ft of type 1-3 water?	YES	Distance: 0
Operating w/in 25 ft of type 4-5 water?	YES	
Aware of any water intakes w/in 1/2 mile downstream?	NO	
Trees to be removed from max. width RMZ?	NO	
Is this project in or near a wetland?	NO	
Will this project fill / drain a wetland?	NO	

ROAD CONSTRUCTION SECTION

Type of construction	Length (ft)	Endhaul (ft)	Steepest Slope
Maintenance of existing road	30	0	20%

TIMBER HARVEST SECTION

No Timber Harvest Activities

FPA #2405693 State of Washington
Received: 01/29/1999 Dept of Natural Resources Classified: CLASS III-30
Decision Date: 02/22/1999 DECISION ACTIVITY PACKET
Expiration Date: 02/22/2001

Double-wide RMZ for green-up? NO
Unit to be reforested? NO

UMA Acres: NONE
Length of RMZ: NONE
Length of WMZ: NONE

AERIAL CHEMICAL APPLICATION SECTION

Type of Chemical Application: NONE

Dept of Agriculture Experimental Use Permit? NO

APPLICANT PROVIDED DETAILS

REPAIR STORM WATER DAMAGE TO FILL, SUT SLOPE, PIPES AND ROAD SURFACE AS SHOWN ON ATTACHED MAPS AND DESCRIPTION. THE FEW TREES THAT WILL BE CUT WILL BE USED ON SITE FOR CURB LOGS (NO VOLUME HAULED OUT OF WOODS). CONATCT BOB KELLER AT 360-825-8117

DNR STAFF COMMENTS

SHUTDOWN ZONE 659 / WEYCO ID 00990020

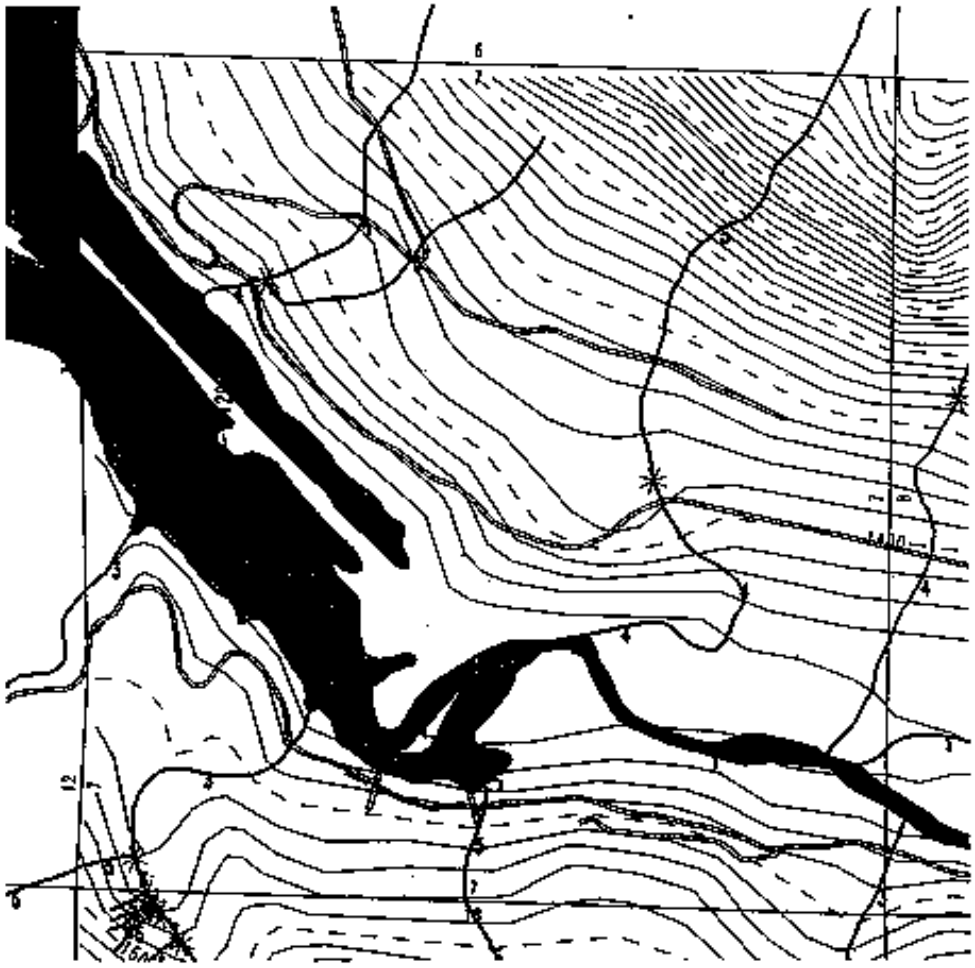
END OF REPORT - FPA #2405693

Packet Created: 02/22/1999

FOREST PRACTICE ACTIVITY MAP

TOWNSHIP 20 NORTH, RANGE 09 EAST (W.M.), SECTION 7
APPLICATION # 2405693

CULVERTS
5 ROUND PIPE
36 " diameter
34 " length
6 ROUND PIPE
30 " diameter
24 " length



SCALE
0 1000 2000 3000 4000 5000 6000
FEET 1 Mile (approx)

MAP DATE: January 30, 1999

N

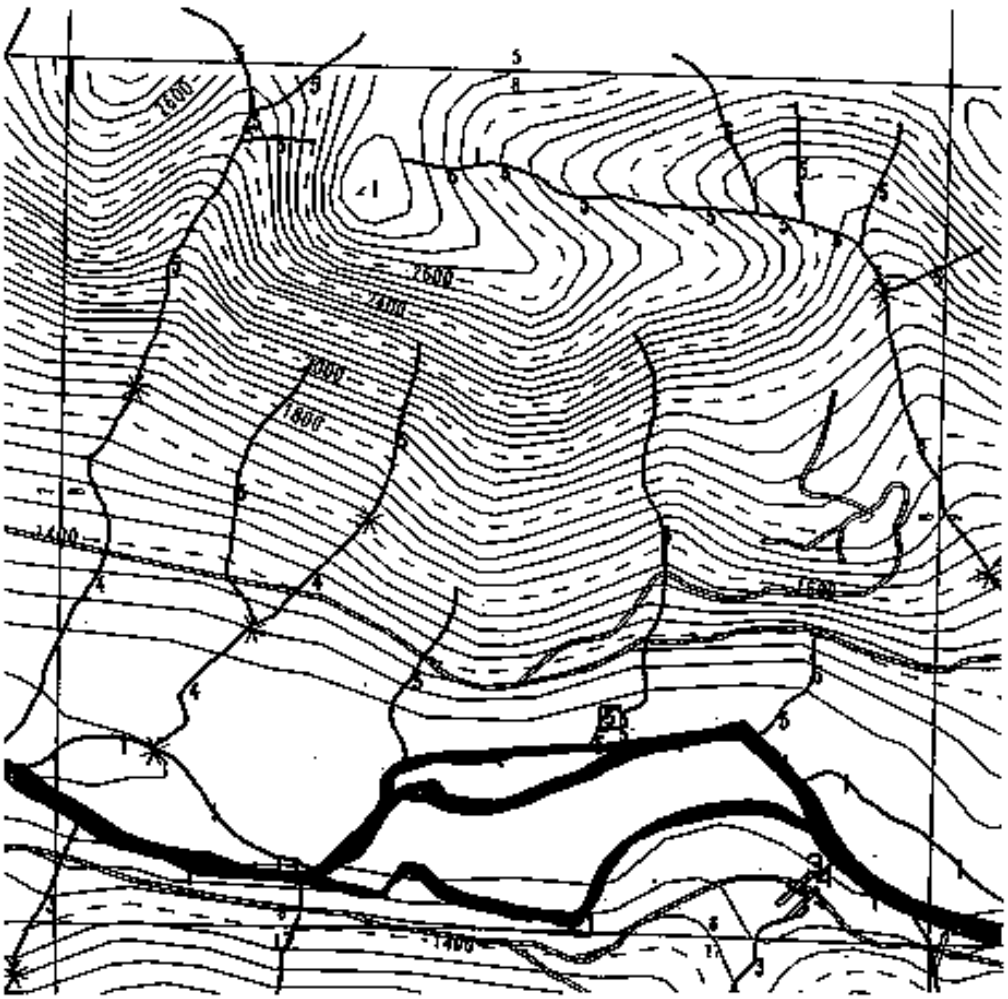
CONTOUR INTERVAL: 40 Feet
NAD 27

LEGEND: See Instructions
DISCLAIMER: See Legend

FOREST PRACTICE ACTIVITY MAP

TOWNSHIP 20 NORTH, RANGE 09 EAST (W.M.), SECTION 8
APPLICATION # 2405693

CULVERTS
2 ROUND PIPE
48 " diameter
35 ' length
3 ROUND PIPE
48 " diameter
40 ' length
4 ROUND PIPE
60 " diameter
45 ' length



SCALE
0 1000 2000 3000 4000 5000 6000
FEET 1 Mile

MAP DATE: January 30, 1999

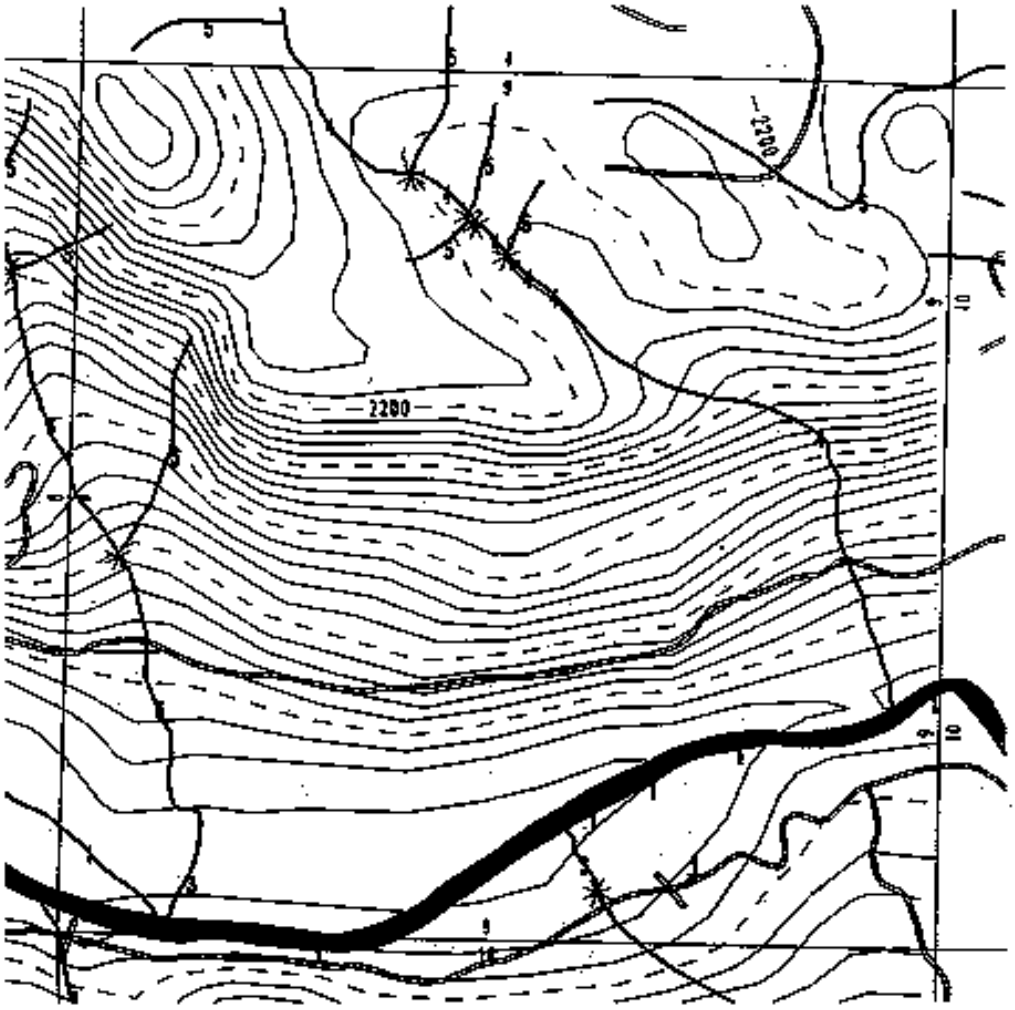
CONTOUR INTERVAL: 40 Feet
NAD 27

LEGEND: See Instructions
DISCLAIMER: See Legend

FOREST PRACTICE ACTIVITY MAP

TOWNSHIP 20 NORTH, RANGE 09 EAST (W.M.), SECTION 9
APPLICATION # 2405693

CULVERTS
1 ROUND PIPE
[illegible] " diameter
[illegible] ' length
2 ROUND PIPE
[illegible] " diameter
35 ' length



SCALE
0 1000 2000 3000 4000 5000 6000
FEET
1 Mile

N

MAP DATE: January 30, 1998

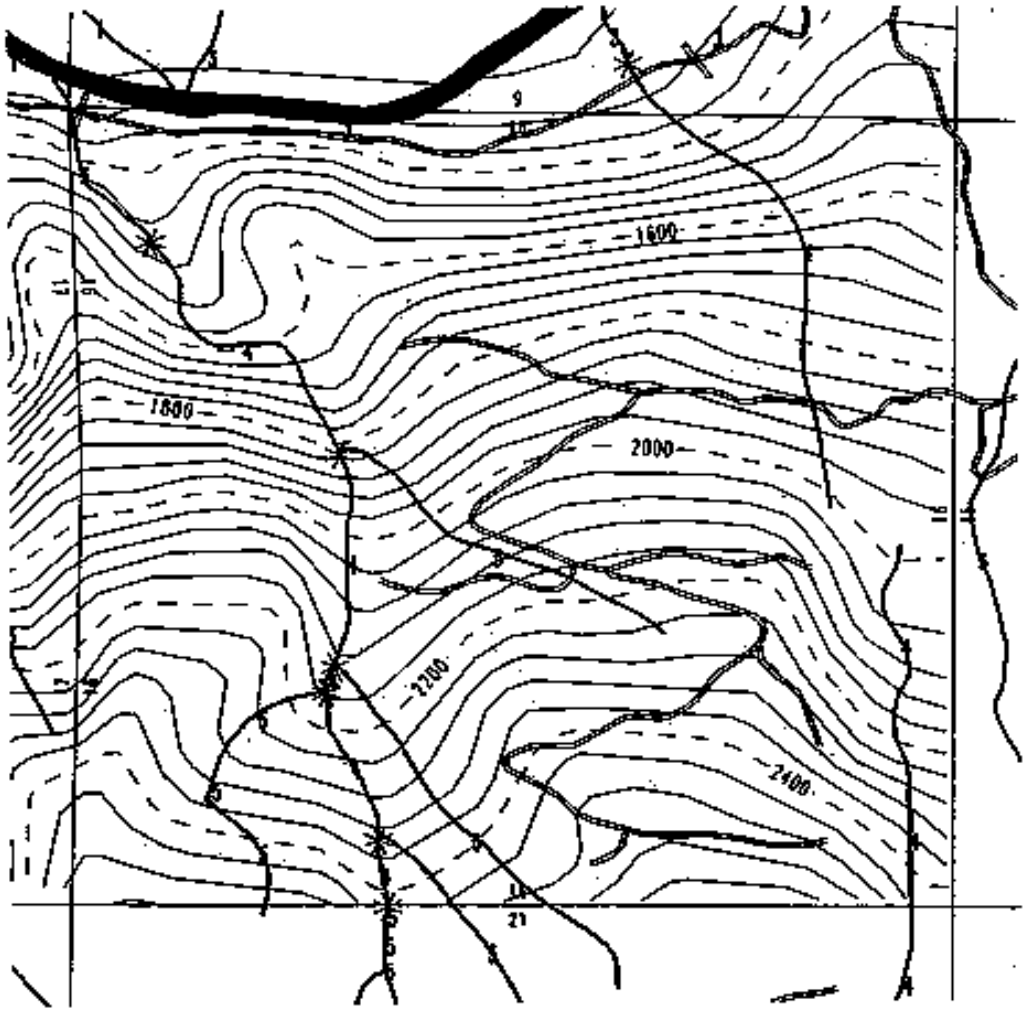
CONTOUR INTERVAL: 40 Feet
NAD 27

LEGEND: See Instructions
DISCLAIMER: See Legend

FOREST PRACTICE ACTIVITY MAP

TOWNSHIP 20 NORTH, RANGE 09 EAST (W.M.), SECTION 16
APPLICATION # 2405693

DRAINAGE
1 ROUND PIPE
48 " diameter
48 " length
2 ROUND PIPE
48 " diameter
36 " length



SCALE
0 1000 2000 3000 4000 5000 6000
FEET
1 Mile

MAP DATE: January 30, 1999

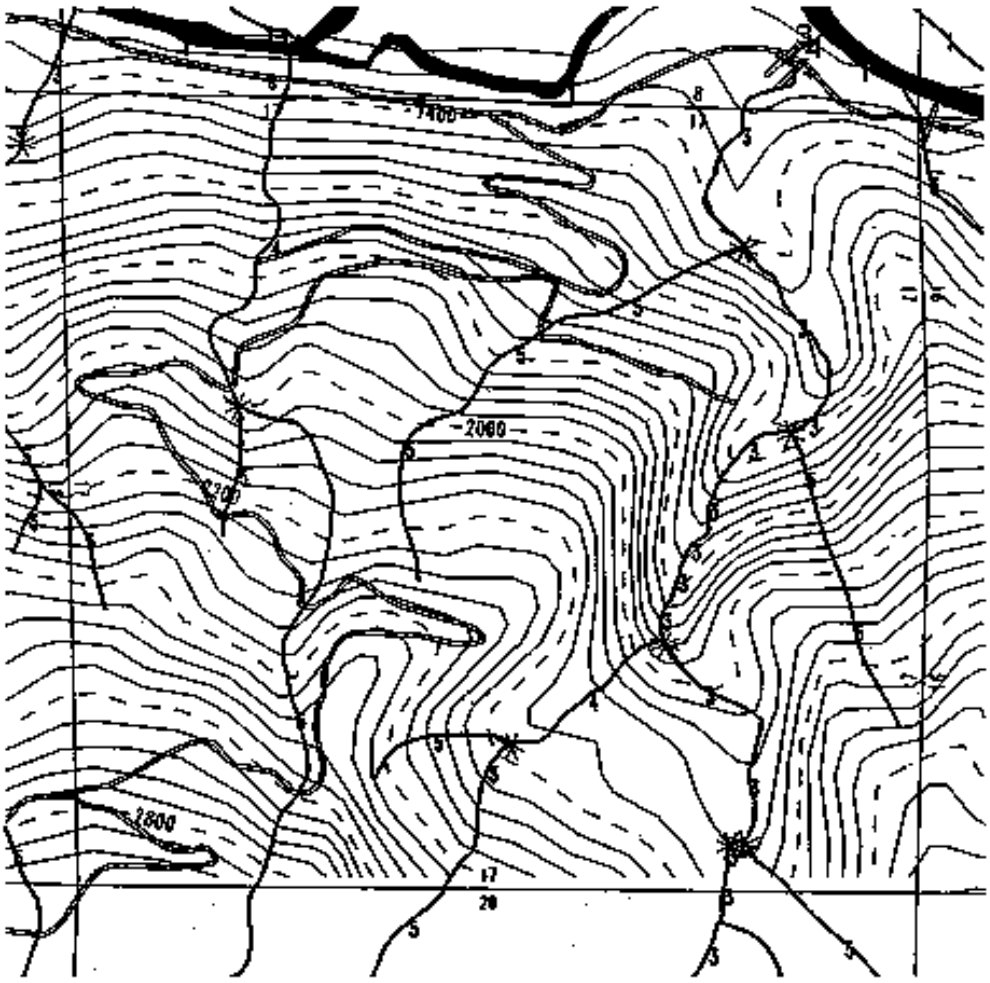
CONTOUR INTERVAL: 40 Feet
NAD 27

LEGEND: See Instructions
DISCLAIMER: See Legend

FOREST PRACTICE ACTIVITY MAP

TOWNSHIP 20 NORTH, RANGE 09 EAST (W.M.), SECTION 17
APPLICATION # 2405693

CULVERTS
2 ROUND PIPE
48 " diameter
35 ' length
3 ROUND PIPE
48 " diameter
40 ' length
4 ROUND PIPE
60 " diameter
45 ' length



SCALE
0 1000 2000 3000 4000 5000 6000
FEET
1 Mile (approx)

MAP DATE: January 30, 1999

CONTOUR INTERVAL: 40 Feet
NAD 27

LEGEND: See Instructions
DISCLAIMER: See Legend

MUCKLESHOOT INDIAN TRIBE

FISHERIES DEPARTMENT

24 February 1999

Ben Cleveland
Washington Department of Natural Resources
South Puget Sound Region
P.O. Box 68
Enumclaw, WA 98022

RE: FOREST PRACTICES APPLICATION 2405693; T20N, R09E, SECTIONS 7, 8, 9, AND 16; GREEN RIVER WATERSHED, KING COUNTY.

Dear Mr. Cleveland:

The Environmental Division of the Muckleshoot Indian Tribe's Fisheries Department has reviewed Forest Practices Application (FPA) 2405693, as well as maps referenced in the application and forwarded upon request. We are grateful for the prompt response to our request for the maps referenced in the application. As discussed below, we find the application provides an ambiguous and incomplete description of the proposal. However, our review of the available information indicates the proposal has potential to cause significant adverse impacts to salmonids and water quality in the Green River basin. We request that the Washington Department of Natural Resources (WDNR) disapprove the application as incomplete, and classify it as a Class-IV application if resubmitted.

Completeness of Application

The application provides an incomplete description of the type and location of proposed activities. With regard to logging, page 2 of the application states "no timber harvest activities." However, on page 3 it states "the few trees that will be cut will be used on site for curb logs." Furthermore, the maps referenced in the application state the logging "will require removal of less than 1/2 acre of trees." None of the maps circulated for review show the location of the trees to be logged, and nowhere does the application indicate the type or method of logging.

With regard to road work, page 2 of the application indicates the proposal encompasses 30 feet maintenance of existing road. The Forest Practices Activity Maps included with the application denote five project sites, whereas the maps referenced in the application denote six, including logging and road repair at a site in T20N, R09E, section 17. The application itself fails to denote any work at that location, and nowhere does the application describe the length of road work at individual project sites.

Impacts to Aquatic Resources

The maps referenced in the application provide the following description of logging and road work at a site in T20N, R09E, section 17: "MP 21.7 = Major slump - cut slope and fill

39015 172nd Avenue Southeast • Auburn, Washington 98092 • (253) 931-0652 • FAX (253) 931-0752

failing. Reshape cut slope and armor with rip-rap. Repair road surface. Reestablish ditch to pipe. Will require removal of less than 1/2 acre of trees. To be used as curb logs." This description fails to define the methods or extent of work on the cut slope, road surface, or road drainage at this slide prone area. The landslide that occurred at the site between 1990 and 1996 delivered debris to the Green River. The poorly defined proposal for additional logging and road work has potential to promote further mass movement by loading, undercutting, or weakening unstable materials at this slide prone area, causing significant adverse impacts to fish habitat and water quality.

The maps referenced in the application also provide the following description of work in T20N, R09E, section 8, near the mouth of Sweeney Creek: "MP 22.88 = 48"x40' CMP and 60" x 45' CMP. 48" pipe plugged during storm and water overflowed road eroding road surface on downstream side. Blockage removed under emergency HPA#D-9000-01. Further maintenance will require rebuilding road base with large rock and resurface. Resurfacing can be accomplished without placing rock or soil in flowing water. Miter inlets of both pipes." The existing culverts at this site may impede upstream passage of some adult salmonids, and are clearly incapable of conveying the volume of water and coarse sediment routed to the site during large storm events, as demonstrated by the upstream channel aggradation and damage to the road. Rebuilding the road base over the existing culverts will merely perpetuate impacts to salmonids and salmonid habitat resulting form the poorly designed stream crossing. WDNR should mitigate the impacts of the stream crossing by requiring the applicant to replace the existing culverts with a bridge.

Conclusion

We request that WDNR disapprove FPA 2405693 as incomplete and classify the proposal as a Class-IV application if resubmitted. Should WDNR decline to act on this request, we seek a written reply specifying the rational for WDNR's decision.

Please phone me at (253) 931-0652, extension 120, if you have any questions pertaining to this letter, and thank you for your attention to this request.

Sincerely,

Patrick Reynolds
Geologist

cc Bob Penhale, Washington Department of Ecology
Phil Schneider, Washington Department of Fish and Wildlife
William Vogel, US Fish and Wildlife Service
Steve Landino, National Marine Fisheries Service
Mike Grady, National Marine Fisheries Service
Ken Merry, Tacoma Public Utilities

WASHINGTON STATE DEPARTMENT OF
Natural Resources

JENNIFER M. BELCHER
Commissioner of Public Lands

March 15, 1999

Patrick Reynolds
Muckleshoot Indian Tribe
Fisheries Department
39015 172nd Avenue Southeast
Auburn, WA 98092

RE: FOREST PRACTICES APPLICATION 2405693, T20N, R09E, SECTIONS 7,8,9, AND 16; GREEN RIVER WATERSHED, KING COUNTY.

Dear Patrick:

As per your request in the letter dated 2-24-99, this is a response specifying the rational for DNR's decision regarding your request for disapproval and reclassification of FPA 2405693 to a Class IV Special.

Cyril Moya, DNR Forest Practice Forester, after an on site inspection verified that this proposal does not meet the criteria for a Class IV Special (WAC222-16-050) and approved the application. The discrepancy in the number of project sites was due to an omission by the DNR when inputting the applicant provided information into our processing system for forest practices. Aside from your comments about the number of trees to be cut and how they were to be cut, the application did an adequate job of describing the proposal. The trees that will be cut at "MP 21.7" are trees that are overhanging a cut bank that will be sloped to a more stable angle prior to being armored with large rip-rap. This trees will be utilized as curb logs to keep traffic off the outside edge of the road. The slope adjacent to this failure was sloped back and rip-rapped in the past and has held up very well. The additional maintenance of this site is expected to provide additional stability of the slope.

In response to your concern over rebuilding the road base over the existing culverts at "MP 22.88", Sweeney Creek, it has been recognized as a poorly designed site and will be corrected with a properly designed bridge. The permanent fix to this stream crossing is one of eight fish habitat enhancement projects designed by the US Army Corps of Engineers. The Corp of Engineers has been working with the landowners, Washington Department of Fish and Wildlife and the Muckleshoot Indian Tribe in scheduling the completion of the Sweeney Creek project within the next year. Weyerhaeuser Company in the mean time is doing temporary repairs to improve the current situation until the bridge can be constructed.

SOUTH PUGET SOUND REGION ▮ 950 FARMAN ST N ▮ PO BOX 68 ▮ ENUMCLAW, WA 98022-0068
FAX: (360) 825-1672 ▮ TTY: (360) 825-6387 ▮ TEL: (360) 825-1631
Equal Opportunity/Affirmative Action Employer

RECYCLED PAPER

I appreciate the time you have taken in responding to this forest practice application. Your involvement in the TFW process is more than just a casual review. Your comments are very welcome and your expertise would be helpful and appreciated in the early stages of the review process. I have encouraged you in the past to contact the DNR forest practice forester and forest practice applicant with your concerns prior to commenting with a letter to me. I have also encourage the applicants to invite you out to preview their projects prior to submittal. I encourage you take advantage of these opportunities to work with the applicant.

The DNR forest practice forester has the authority and is responsible for conditioning, approving or disapproving the applications within their area of responsibility. In the future, before you comment to me, I would appreciate it if you would deal directly with the appropriate DNR forest practice forester. If you are not satisfied with their decisions you should most definitely bring it to my attention. I believe you will find that your concerns are dealt with more expeditiously since they are the critical contacts regarding the outcome of a particular forest practice.

If you should have any further questions about this specific application please contact Cyril Moya at (253) 639-9639.

Sincerely

Ben Cleveland

Ben Cleveland
Resource Protection District Manager

FPA #2405555
Received: 11/19/1998
Decision Date: 12/29/1998
Expiration Date: 12/29/2000

State of Washington
Dept of Natural Resources
DECISION ACTIVITY PACKET

Classified: CLASS IVS

Risk Assessment Issue: Timber harv within 25 feet of type 4-5 water
IV-S Reason: Timber harvest UNSTAB SLP

Legal: NE of Section 18; T20R10E W.M.
County: KING
Region: SOUTH PUGET SOUND

Assigned to: CYRIL MOYA
Phone: (360) 956-1921

Operator:
CITIFOR INC
1425 N WASHINGTON
OLYMPIA WA 98501

Corporation

Landowner:
TACOMA PUBLIC UTILITIES
P.O. Box 11007
TACOMA WA 98411

Phone: (206) 383-9694
WATER DIVISION

Municipal subdivision

Timber Owner:
CITIFOR INC
1425 N WASHINGTON
OLYMPIA WA 98501

Phone: (360) 956-1921

Corporation Ttax#: 800006876

This application is | APPROVED | subject to the following:

Activity under this application must follow current Washington State Forest Practice Rules and Regulations.

Compliance with this application does not ensure compliance with the Endangered Species Act or other Federal, State or Local laws.

FPAN-2405555 Conditions

THERE WILL BE NO HARVEST ACTIVITY BETWEEN MARCH 1 AND AUGUST 31. OWL HABITAT HAS BEEN IDENTIFIED AND OMITTED FROM HARVEST UNIT.

This decision may be appealed under WAC 222-08-010 by contacting the DNR Regional office listed above or calling 1-800-527-3305.

FPA #2405555
Received: 11/19/1998
Decision Date: 12/29/1998
Expiration Date: 12/29/2000

State of Washington
Dept of Natural Resources
DECISION ACTIVITY PACKET

Classified: CLASS IVS

No TRAXS Flags

Within city limits?	NO
Harvest within 500 ft of park?	NO
Harvest within park?	NO
Land platted after 1/1/60?	NO
Intends to convert w/in 3 years?	NO
Has Conversion Option Harvest Plan?	NO

WATER AND WETLAND INFORMATION SECTION

Works in Waters	Water Type 1	2	3	4	5	Wetlands Type Forested	A	B
Road Construction	.	.	.	.	.	.	.	.
Water Crossing	.	.	.	.	.	.	.	.
Falling / Bucking	.	.	.	.	.	.	.	.
Cable Yarding	.	.	.	.	.	.	.	.
Suspend Cables	.	.	.	.	5	.	.	.
Ground Skidding	.	.	.	.	.	.	.	.
Operate Equipment	.	.	.	.	.	.	.	.
Apply Chemicals	.	.	.	.	.	.	.	.
Other Activity	.	.	.	.	.	.	.	.

Operating w/in 200 ft of type 1-3 water?		NO	Distance: 0
Operating w/in 25 ft of type 4-5 water?	YES		
Aware of any water intakes w/in 1/2 mile downstream?		NO	
Trees to be removed from max. width RMZ?	NO		
Is this project in or near a wetland?		NO	
Will this project fill / drain a wetland?		NO	

ROAD CONSTRUCTION SECTION

Type of construction	Length (ft)	Endhaul (ft)	Steepest Slope
New permanent road construction	1,000	400	60%
Abandonment of existing road	400	0	0%

TIMBER HARVEST SECTION

Unit No.	Type of Harvest	Post-Harvest Trees/Acre	Method of Harvest	Tot harv Acres App	GIS	Volume Percent	Volume (MBF)
1	EVEN AGE	5	HIGH LEAD	45.0	54.7	100	1,500

FPA #2405555
Received: 11/19/1998
Decision Date: 12/29/1998
Expiration Date: 12/29/2000

State of Washington
Dept of Natural Resources
DECISION ACTIVITY PACKET

Classified: CLASS IVS

Green Recruitment Trees will be: CLUMPED
Wildlife Reserve Trees will be: CLUMPED

Double-wide RMZ for green-up? NO
Unit to be reforested? YES BY PLANTING DOUGLAS FIR

UMA Acres: NONE
Length of RMZ: NONE
Length of WMZ: NONE

AERIAL CHEMICAL APPLICATION SECTION

Type of Chemical Application: NONE

Dept of Agriculture Experimental Use Permit? NO

Supplemental document: Environmental check list

APPLICANT PROVIDED DETAILS

THIS APPLICATION IS A CLASS IV SPECIAL. DUE TO A SPOTTED OWL NEST JUST OFF THE PROPERTY. THE SEPA CHECKLIST AND AMENDMENTS IS ATTACHED. THIS AREA IS WITHIN TH UPPER GREEN RIVER-LESTER WAU. ALL WATERSHED ANALYSIS PRESCRIPTIONS WILL BE FOLLOWED. THE OWL HABITAT HAS BEEN IDENTIFIED BY PHIL SCHNEIDER WAF&W (10/8/98) PERMIT PREPARED BY RK JOHNSTONE (360)269-1135 AND GARY TAYLOR (360)753-5050. UPON COMPLETION OF HARVEST OPERATION THE LAST 400 FT OF THE NEW CONSTRUCTION WILL BE ABANDONED BY PULLING THE CULVERT(S) AND OUT-SLOPING THE GRADE. THIS ARE IS A RIDGE TOP ROAD THAT SHOULD HAVE LITTLE POTENTIAL FOR FAILURE. MATERIAL CREATED BY OUT-SLOPING WILL BE PILED ON INSIDE EDGE OF ROAD.

DNR STAFF COMMENTS

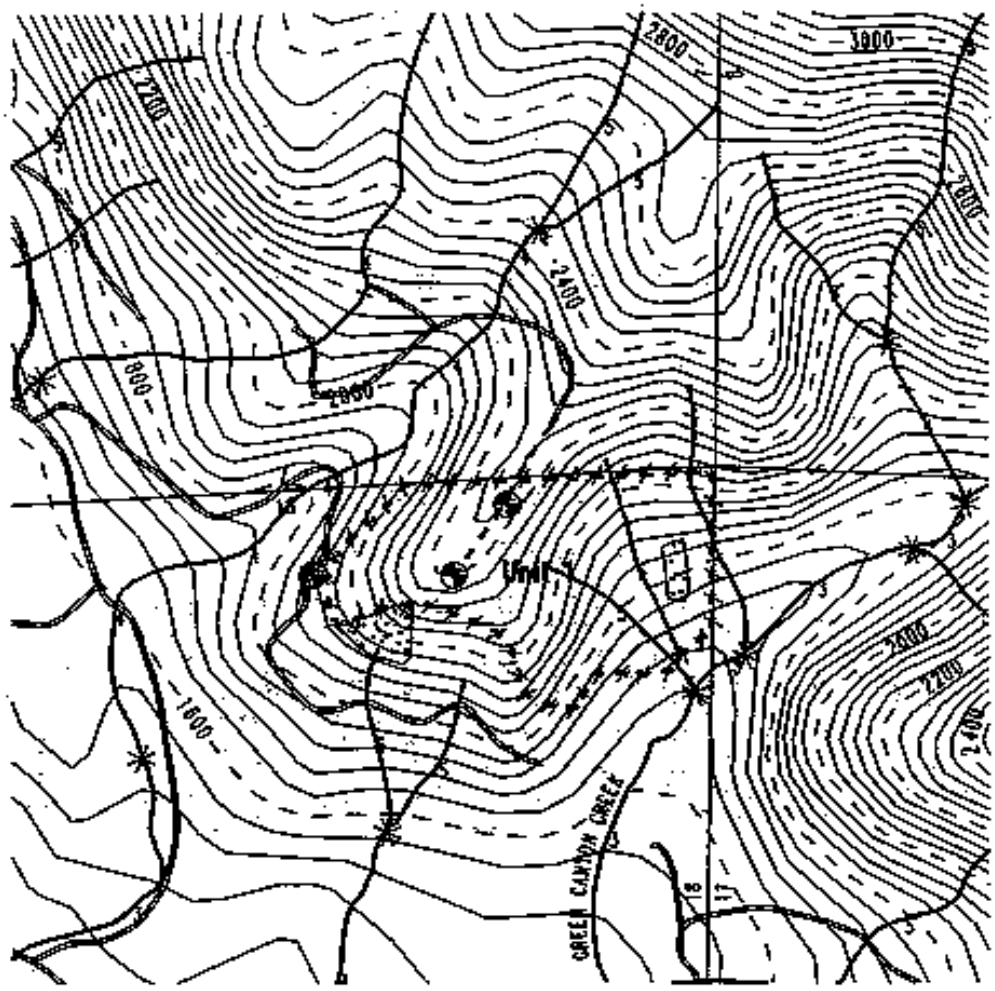
SHUTDOWN ZONE 659 RMS-CASH

END OF REPORT - FPA #2405555

Packet Created: 12/29/1998

FOREST PRACTICE ACTIVITY MAP

TOWNSHIP 20 NORTH, RANGE 10 EAST (W.M.), SECTION 7
TOWNSHIP 20 NORTH, RANGE 10 EAST (W.M.), SECTION 17
TOWNSHIP 20 NORTH, RANGE 10 EAST (W.M.), SECTION 18
APPLICATION # 2405555



SCALE
0 1000 2000 3000 4000 5000 6000
FEET 1 Mile

MAP DATE: December 29, 1998

N

CONTOUR INTERVAL: 40 Feet
NAD 27

LEGEND: See Instructions
DISCLAIMER: See Legend

WASHINGTON STATE DEPARTMENT OF
Natural Resources
Jennifer M. Belcher - Commissioner of Public Lands
Gideon Cunningham - Supervisor

Forest Practices
Informal Conference Note

Subdivisions	Sections	Twps.	Rges. (E/W)	Application/Notification #'s	Classes
N½ NE¼ NE¼	18	20	10	2405555	

Landowner	Timber Owner	Operator
GIUSTINA	CITIFOR, INC	CITIFOR
Address: PO BOX 529	Address: 1425 N. WASHINGTON	Address: 1425 N. WASHINGTON
City: EUGENE State: OR Zip: 97440	City: OLYMPIA State: WA Zip: 98501	City: OLYMPIA State: WA Zip: 98501

Meeting Location	Telephone Conference	Date	Time	Region
ON SITE	☐	1-21-99	10:00	SPS

Subjects Discussed

WALKED UNIT LOOKING FOR HOLLOWS AND CHANNEL HEADS WHICH WERE OF CONCERN ~~THE~~ AND MENTIONED IN A LETTER FROM PATRICK RENOLDS DATED 12-23-98. THESE FEATURES ARE NOT PRESENT IN THIS UNIT. INNER GEORGE FEATURES HAD BEEN IDENTIFIED AND BOUNDED OUT WITH NO-CUT BUFFERS

Decisions Made

NO CUT BUFFERS WERE CHANGED TO COMPLY WITH NEW DRAFT PRESCRIPTIONS (DATED 1-20-99).

CITIFOR WILL NOTIFY DNR 2 WEEKS PRIOR TO BEGINNING OPERATION FOR INSPECTION OF BUFFERS.

PRINT Participants Names	SIGNATURES of Participants	Representing	Copy Mailed
BOB JONSTONE	[signature]	CITIFOR	
TODD BOHLE	[signature]	DNR	☐
CYRIL MOYA	[signature]	DNR	☐
			☐

Position Number	Signature and Title of DNR Representative	Date	Work Phone Number
	[signature] Forest Practices Forester		

[Participant signature means Note is correct for subjects and decisions discussed at the meeting.]
Did Not Attend, Mail Copies to:
Timber Owner ☐ Landowner ☒ Other Parties ☒ PATRICK RENOLDS ~~[illegible]~~
BC, DNR, FPD

0038
3/97 sc

White—Region Canary—Operator Pink—DNR Representative

RECYCLED PAPER PRINTED IN U.S.A.

02955

MUCKLESHOOT INDIAN TRIBE

FISHERIES DEPARTMENT

23 December 1998

Art Tasker
Washington Department of Natural Resources
South Puget Sound Region
P.O. Box 68
Enumclaw, WA 98022

RE: FOREST PRACTICES APPLICATION 2405555; T20N, R10E, SECTION 18; GREEN CANYON CREEK BASIN; GREEN RIVER WATERSHED, KING COUNTY.

Dear Mr. Tasker:

The Environmental Division of the Muckleshoot Indian Tribe's Fisheries Department has reviewed Forest Practices Application 240555 as well as the Environmental Checklist and other documents distributed with the Determination of Nonsignificance issued by the Washington Department of Natural Resources (DNR) on 9 December 1998. The application proposes approximately 1,000 feet of new road construction and 45 acres of clearcut logging in the Green Canyon Creek basin. Our review indicates that this project is reasonably likely to cause significant adverse impacts to salmonids and water quality, and therefor we request that the DNR withdraw its threshold determination for this proposal.

The applicants propose logging on steep-gradient slopes in the Green Canyon Creek basin, which is located in the Lester Watershed Administrative Unit (WAU). Portions of the proposed logging unit are classified as Mass Wasting Map Unit 11 (MWMU-11), as delineated by the watershed analysis for the Lester WAU conducted pursuant to Chapter 222-22 WAC. Slopes within MWMU-11 typically include bedrock hollows and channel heads. Logging near such slide prone features within MWMU-11 is reasonably likely to cause landslides that will have a significant adverse impact on salmonids and water quality. The DNR should presume slide prone areas such as bedrock hollows and channel heads are present on slopes classified as MWMU-11 unless there is definitive evidence to the contrary.

The applicants' proposal fails to demonstrate that slide prone areas such as bedrock hollows and channel heads do not exist within portions of the logging unit classified as MWMU-11, where the applicant proposes clearcut logging. The impacts from logging on such slide prone areas in MWMU-11 will likely combine with those of past forest practices to cumulatively degrade salmonid habitat and water quality.

39015 172nd Avenue S.E. * Auburn, Washington 98092 * (253) 931-0652 * FAX (253) 931-0752

We request that you withdraw the Determination of Nonsignificance for Forest Practices Application 2405555 because the project will likely contribute to and prolong direct and cumulative impacts to salmonid habitat and water quality in the Green River watershed that have already occurred as result of logging and road construction. In addition, we request that you disapprove the application pursuant to 222-22-020(5), until field conditions enable a DNR slope stability expert to properly evaluate the application in the field.

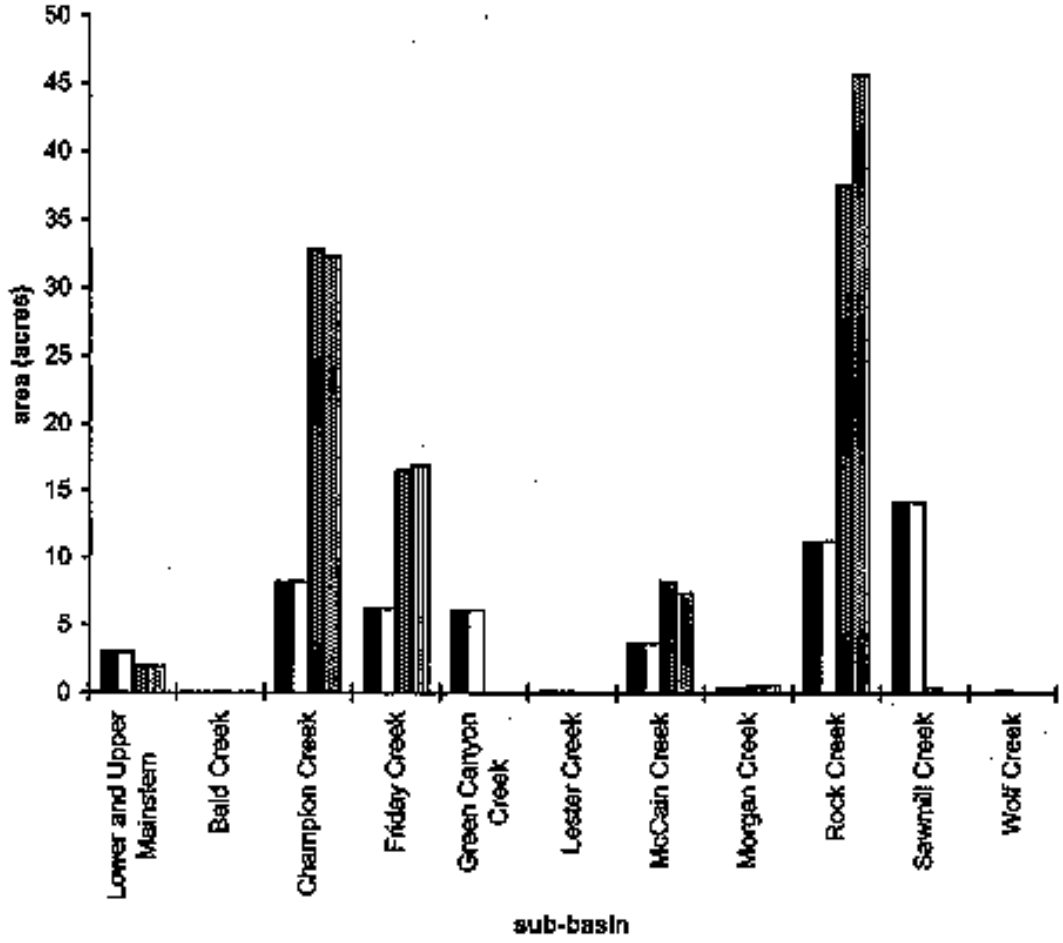
Please phone me at (253) 931-0652, extension 120, if you have any questions pertaining to this letter, and thank you for your attention to this request.

Sincerely,

Patrick Reynolds
Geologist

cc Dave Dietzman, Washington Department of Natural Resources
Bob Penhale, Washington Department of Ecology
Phil Schneider, Washington Department of Fish and Wildlife
William Vogel, US Fish and Wildlife Service
Steve Landino, National Marine Fisheries Service
Mike Grady, National Marine Fisheries Service
Ken Merry, Tacoma Public Utilities

area of selected landslide features,
Lester watershed administrative unit, King County, Washington,
after Coho (1996), and Reynolds (1996)



■ NON-MANAGEMENT-RELATED LANDSLIDES: SCARPS AND RUNOUT (after Reynolds, 1996: see Form A-1). Note: excludes landslides that did not deliver debris to a stream, as well as landslides mapped as snow avalanche, rock fall, or dam-break flood.

□ NON-MANAGEMENT-RELATED LANDSLIDES: SCARPS (after Coho, 1996: see Table 4B-3). Note: "[t]o qualify, an area had to be contributing sediment to stream channels, and ...composed of a soil surface...snow avalanche zones...and talus zones...were disqualified."

▩ MANAGEMENT-RELATED LANDSLIDES: SCARPS AND RUNOUT (after Reynolds, 1996: see Form A-1). Note: excludes landslides that did not deliver debris to a stream, as well as landslides mapped as snow avalanche, rock fall, or dam-break flood.

▥ MANAGEMENT-RELATED LANDSLIDES: SCARPS (after Coho, 1996). Note: values back-calculated from data in table 4B-5 and assumptions described in report.

Muckleshoot Indian Tribe Fisheries Department, March 2000

ATTACHMENT B

Attachment B: June 15, 1998 MIT Comment letter to AWSP HHD and November 30, 1998 MIT comment letter to Final Feasibility Report and EIS for AWSP HHD

MUCKLESHOOT INDIAN TRIBE

39015 172nd Avenue S.E. • Auburn, Washington 98092-9763
Phone: (253) 939-3311 • (253) 939-5311

June 15, 1998

Colonel Rigsby
U.S. Army Corps of Engineers
Seattle District
4735 E. Marginal Way S.
Seattle, WA 98124-2255

RE: ADDITIONAL WATER STORAGE PROJECT, DRAFT FEASIBILITY REPORT AND EIS; HOWARD HANSON DAM, GREEN RIVER, WASHINGTON.

Dear Colonel Rigsby:

The Muckleshoot Indian Tribe has received the referenced draft documents regarding the proposed Howard Hanson Additional Water Storage Project (AWSP) and offers the following comments. Because of the extremely large volume of technical material provided for our review and the refusal of our first requested deadline extension, these comments should not be viewed as a complete response to all issues presented in the draft report and its nine appendices. Therefore, we reserve the option to comment further on this proposal as future opportunities arise. By way of this letter we formally request that the Tribe be given an extension to complete its review of the DEIS and its technical appendices and submit additional comments.

The Muckleshoot Indian Tribe is a federally recognized tribe whose reservation is located in King and Pierce Counties. The Muckleshoot Indian Tribe has rights under and is the successor to certain bands and tribes who were parties to the Treaty of Point Elliott (12 Stat. 927) and the Treaty of Medicine Creek (10 Stat. 1132). The Muckleshoot Indian Tribe holds federally guaranteed rights under the Treaty of Point Elliott, including fishing and hunting rights, in the Green/Duwamish River system. These rights were retained in

exchange for lands ceded by the Tribe in the treaties and are considered property rights. The Muckleshoot Indian Tribe has rights and responsibilities for the management of fish, wildlife, other natural resources, and cultural resources of the Green/Duwamish system, including the protection of those resources from environmental degradation. These comments have been generated in the interest of protecting the Tribe's treaty resources.

Due to the complex nature of the DEIS and its appendices and the need to place its project impacts in context of the other federal actions above the Dam, Tribal staff have not had sufficient time to thoroughly evaluate the proposed mitigation measures, the magnitude of the impacts of the project upon salmon and their habitat, and the potential benefits of the project. The Tribe is concerned that the proposed fisheries mitigation measures will be insufficient and that the purported benefits will not be realized. The project is fraught with uncertainty, with even the Corps admitting that it is unable to provide a determination on project effects for chinook below the Dam.

Numerous simultaneous federal actions are occurring above Howard Hanson Dam that, individually and cumulatively with the Additional Water Storage project, will impair Treaty rights and could limit the potential benefits for this project. For example, the DEIS failed to consider the effects of two Habitat Conservation Plans, a major federal land exchange, and other federal actions. The DEIS is also filled with inaccuracies, inconsistencies, assumptions, and misrepresentations. The FEIS should analyze the effects of multiple federal actions occurring in and around the project area and correct errors as noted in our page specific comments.

The DFR/DEIS and its recommendations imply that Phase II implementation will inevitably follow Phase I. The approval and implementation of Phase II requires a consensus of the agencies and the Muckleshoot Indian Tribe, as agreed in the October 28, 1997 Howard Hanson Dam Additional Water Supply Proposal document put forth by TPU and the Corps of Engineers. The agency resolution process seeking federal funding support for the AWSP was explicitly limited to Phase I due to the higher level of ecosystem risk in Phase II. The entire phased implementation approach was predicated on postponing Phase II, perhaps indefinitely, subject to the outcome of adaptive management learning, the details of which remain only vaguely defined. We request that this commitment be reinforced within the FEIS. We also request that a new environmental impact analysis be completed for Phase II of this project.

The Tribe's view of the project's potential restoration encompasses a wide range of possible alternatives that include supplementation, and an evaluation plan with specific actions tied to results of the evaluation. Instead, the DEIS appears to approach salmon restoration from the narrow perspective of self-sustaining, naturally reproducing salmon colonizing the upper basin in numbers. While the Tribe holds the same ideal outcome to heart, a number of tribal and agency biologists do not believe that self-sustainability is a probable outcome for chinook and/or coho. However, analyses regarding hatchery

supplementation and potential adult survival relied too heavily on optimistic assumptions on natural production, and should be re-evaluated jointly with tribal staff.

The narrow viewpoint of self-sustainability of salmon runs in concert with implied harvest management restrictions may not be realistic. Neither past fisheries management nor current discussions between the co-managers support this viewpoint. The DEIS suggests that changes in harvest management are needed to achieve the goal of self-staining runs above the dam. Given the projected 40% mortality for chinook through the reservoir and dam, it would be necessary to curtail all fishing in Canada and substantial reductions in Puget Sound to offset this mortality rate. Full restoration should not rely on decreases in harvest to compensate for production losses due to regional water supply needs.

We are also concerned that the Corps has not given the restoration goals and objectives of the Tribe the same weight as state and federal agencies and King County. The DEIS discusses the goals of establishing runs of chinook and coho salmon and steelhead trout above Howard Hanson Dam and maintaining existing anadromous salmonid populations by ensuring no net loss of lower watershed habitat. However, the DEIS lacks any recognition of the Tribe's goal to substantially increase the quality and quantity of habitat downstream of the TPU Diversion Dam so as to increase salmon production. It is unclear why the Tribe's goals have not been included into the project objectives given the Corps fiduciary responsibility to protect the Tribe's treaty resources. The Corps has the power to significantly improve habitat downstream of the dam independent of this project by simple modification of procedures at the dam and should conduct such activities in the interest of the Tribe's goals for the Green River.

We have also some major specific concerns regarding the impacts and alleged benefits of the project as follows:

- The DEIS does not accurately reflect the positions taken by Muckleshoot Indian Tribe through its Fisheries Department staff, and does not accurately present the Tribe's involvement in discussions or activities part of or tangential to the project.

- The DEIS narrowly defines the extent of the project area to minimize the magnitude of the project's impacts upon cultural resources and avoids a discussion of the existing project impacts upon cultural resources.

- The rigor of the underlying review of the HHD AWS is suspect when primary citations are not used or citations are lacking. For example, the DEIS contains numerous, unsubstantiated statements claiming that the habitat quality above the HHD is good or prime, despite the presence of other documents produced by the Corps and the US Forest Service containing statements to the contrary.

- Many of the proposed mitigation or restoration measures should not be credited to this project as they are required or are policies implemented under other programs. Also, many proposed restoration actions, often specified as contingent on the project, are actions that should be taken by TPU and the Corps to mitigate the downstream impacts caused by the existing presence and operation of the dams, regardless of this project.

This project, as described, is a water use project, albeit with some salmon enhancement features added, that has the potential to significantly degrade salmon habitat and lower salmon production. The water generated from this project will promote continued urban growth and development within areas where chinook and other salmonids are produced. It is unlikely that the restoration and mitigation components of this project will offset these impacts.

Further page specific comments concerning, fisheries, wildlife, and cultural resources are attached to this letter. These comments are in addition to this cover letter and constitute the tribal comments on this proposal to date. Your immediate attention to all of our comments and concerns is appreciated. Isabel Tinoco, the Fisheries Department Director, will be the lead contact for the Tribe for this project. She and the other staff of the Muckleshoot Indian Tribe represent the interests of the Tribe. Please direct your questions regarding this letter and the attached comments to her.

Sincerely,

John Daniels Jr.

Tribal Chair
John Daniels, Jr.

Attachments

cc: NMFS- William Stelle
USFWS - Michael Spears
WDFW- Bern Shanks
EPA - Chuck Clarke

GENERAL REMARKS

The Tribe continues to have serious concerns about the environmental impacts of the Howard Hanson Dam Additional Water Storage Project. Increased storage presents a significant perturbation to the Green River that may contradict ecosystem restoration objectives. Success of the keystone AWSP restoration element - the proposed fish passage structure - is highly uncertain when combined with a greater reservoir storage burden. While the proposed passage structure is superior to existing dam outlets, even the best outlet design can restore only an imperfect connection between the lower and upper watershed due to the intervening reservoir. The enlarged reservoir would require a refill volume as much as 245% greater than the existing reservoir. Considering present Green River habitat limitations and those likely to be introduced by the AWSP, the DFR/DEIS is unconvincing that the restoration goal of self-sustaining salmon and steelhead runs is achievable, especially for chinook.

The AWSP impact analysis relies upon a daily flow spreadsheet model and a set of biological assumptions. To its credit, the DFR/DEIS acknowledges that these impacts, particularly on downstream juvenile migration, are difficult to predict with confidence given an imperfect set of life history assumptions. The minimum baseflows proposed as a mitigation strategy offer some added protection relative to instream flow requirements, yet are frequently lower than spring flows now present in the river. The proposed maximum reservoir refill rates again will provide some protection, yet refill will be prolonged over a longer duration. The use of artificial freshets to promote outmigration survival, particularly at levels modeled, may inadvertently strand as many fish as it transports. In response to these and other concerns, much reliance is made on adaptive management to address project risks and uncertainties. As stated in Appendix F, the first essential element of adaptive management is that "the possibility of failure must be acknowledged and included in policy decisions" (Fluarty and Lee, 1988). We see little in the DFR/DEIS that provides for or acknowledges the possibility of failure.

The position held in the DFR/DEIS that 95% salmon survival through the HHD will restore salmon runs is fallacious. Restoration of salmon above HHD is not based upon percent survival at any one part of their life history above the HHD, but upon the total number and condition of outmigrating juvenile salmon that pass beyond the HHD and reach the estuary. However, the habitat, that determines the number of salmon that can be produced, above HHD dam, contrary to statements in the EIS, are not good. Indeed, DFR/DEIS statements concerning the quality of the habitat and estimated salmon production are contradicted by statements contained in the Green/Duwamish River Basin General Investigation Ecosystem Restoration Study Reconnaissance Phase. The Corps is basing it prediction of the number of salmon produced above the dam upon comparison to other systems in much better shape and upon data collected in those systems often decades before. The futility of using such data to support estimates of production is illustrated that production values based upon those estimates failed to prevent the NMFS from being prepared to recommend that chinook salmon be listed as a threatened species.

Improving passage through the Dam will be meaningless unless, the natural spawning habitat can produced significantly greater numbers of fish than are planted above the Dam currently. The passage facility might be swapping one mortality factor for another without a net gain in production. The Corps in the Green/Duwamish River Ecosystem Study writes in regard to the estimate of producing approximately 15,000 coho, 2,500 steelhead and 5,600 chinook above the HHD that:

> *This estimate assumes that the habitat currently above the reservoir is in excellent shape and could support juvenile densities comparable to other relatively pristine systems. ....However, it is likely that any estimates of salmonid production in the upper watershed are optimistic and that actual production might be much lower. The rearing habitat for species such as coho appears to be particularly limited.*

There is insufficient information is presented in the EIS to determine if riparian and stream habitat will be fully mitigated. Indeed, the EIS admits the applicants are unsure of many of the impacts. Additionally, the DFR/DEIS appears to attempt to hold the possibility of "ecosystem restoration" under the auspices of the Green-Duwamish River Basin General Investigation Ecosystem Restoration Study Reconnaissance Phase hostage to the successful implementation of the HHD AWS. This statement is reinforced by statements regarding actions that will not occur unless the HHD AWS is implemented, such as gravel nourishment, actions that are being considered under the Ecosystem Restoration Study.

Reading part of the DFR/DEIS is difficult because of the liberal use of the term "ecosystem restoration" and "project". Thus, it is difficult to separate "ecosystem restoration" allegedly attributable to the HHD AWS project with the "ecosystem restoration" proposed by the US Army Corps, Green-Duwamish Ecosystem Restoration Project. Furthermore, the Green-Duwamish Ecosystem Restoration is also known as a "project". Therefore, when ecosystem restoration is being discussed in terms of the project, it is difficult to sort out what action might be associated with what project.

SPECIFIC COMMENTS : DFR/DEIS:

Many of the citations used in the DFR/DEIS narrative are secondary citations, rather than primary citations. Additionally, many statements presented as fact or well founded conclusions lack supporting citations. Though, Appendix F include some of the missing citations, each statement in the DFR/DEIS narrative should be properly cited. What is speculation, rather than fact supported by the literature should be clearly specified. Furthermore, given the uncertainty regarding the benefits of the project, each debatable or open to interpretation statement should be supported by citation. For example the following statements are presented as fact, but actual are speculation:

Page 139	While this habitat is degraded from pre-management conditions, it is still considered highest quality habitat or has much greater recovery potential than much of the Lower Green River stream habitat.
Page 16	In 1929, the State Department of Game ...
Page 17	No escapement goals have been established for the Upper Green.
Page 17	Of the seven original anadromous stocks ...
Page 249	... very few areas in the upper Green exceed 14° C, which is near the optimum range for growth of most life stages of salmon
Page 249	... upper basin stream habitat is generally in good condition with percent pools ranging from 28-73%.
Page 31	Initial releases of wild salmon ...
Page 50	.... they (MIT) were the one party not granting conditional acceptance to the project...
Page 61, 138	Of the remaining side channel habitat, the HHD AWS Project could seasonally dewater an additional 8.4 acres.
Page 81	The habitat above the dam is not pristine; it has also been degraded from timber harvest, but remains high quality in comparison to most of the Lower River.
Page 84	The Muckleshoot Tribe has not accepted the HHD AWS Project but is implicitly committed to the recommended facility through the FPTC acceptance.
Page 89	A brief evaluation of the hydraulic characteristics of the Upper Green River site [RM 60 to 57] showed that gravel placement there would be transitory and largely ineffective without incorporating retention structures.
Page 89, 250	This measure is estimated to maintain 400,000 ft^2 of spawning habitat in the Middle Green River over a 50-year period

Page 81. The reconnection of the Upper River ... is the greatest single measures available for restoring significant fish runs to the Green River basins.

Page 205 WDFW spawning surveys show that chinook, coho and steelhead use parts of this sub-basin for spawning; however, this section contains more rearing habitat than spawning habitat.

Pages 8, 29. The DFR/DEIS should acknowledge the potential conflict between anadromous fish protection and recreational releases.

Page 8 and 28 - There are conflicting statements in the DFR/DEIS regarding flow requirements for salmon and steelhead. A statement on page 8 claims that it is unknown what flows are necessary for salmonids, then on page 28, the DFR/DEIS claims that an unreferenced study by MIT and DOE found that flows are inadequate to meet salmonid needs. See also last paragraph on Page 74.

Page 9. Also 4.1.1, Page 116. The DFR/DEIS notes that instead of storing 5,000 ac-ft during drought estimated to occur one in five years on average *"recent negotiations have resulted in the change to yearly storage if the Additional water storage proceeds"*. These negotiations have not resulted in tribal concurrence on annual storage, except to agree that annual storage of 5,000 ac-ft could be an option pending improved understanding of trade-offs between steelhead incubation needs and other species and life stages, and actual runoff conditions in any given year.

Page 9. The temperature analysis notes that at times the additional storage of water will be responsible for increasing water temperatures. Since there are already temperature violations above the dam (Smay and Gale Creeks on the 303(d) lists, which means that the state and PEA recognize that these temperature violations are due to human activity) and at the inflow, the FEIS should state if the incremental water quality standard allow for additional temperature increases, regardless of the temperature downstream. Additionally, throughout the discussion of temperatures, average daily temperatures are typically used rather than maximum, thus underestimating the level and temporal duration of exceedances of state water quality standards.

Pages 13, 182. Discussions under headings of Treaty Tribes Rights, Corps Trust Responsibility and Native American Relationships should provide adequate background and recognize federal obligations to protect treaty fish resources and the ability of the Tribe to exercise its fisheries. The FEIS should at a minimum include the following language:

> The Muckleshoot Indian Tribe is a federally recognized tribe located on the Muckleshoot Indian Reservation in King and Pierce Counties. MIT has rights under and is the successor to certain bands and tribes who were parties to the Treaty of Point Elliott (12 Stat. 927) and the Treaty of Medicine Creek (10 Stat. 1132). MIT holds federally guaranteed rights under the Treaty of Point Elliott, including fishing and hunting rights, in the Green/Duwamish River system. These rights were retained in exchange for lands ceded by the Tribe in the treaties and are considered

property rights. MIT has rights and responsibilities for the management of the fish and wildlife resources and other natural resources of the Green/Duwamish basin, including the protection of those resources from environmental degradation. While salmon and steelhead fishing remains the center of tribal culture, subsistence, and economy, fishing opportunity has been severely restricted in recent years due to low abundance.

Page 14. Beginning in 1992, priority for refill timing and operations was shifted to protect lower river fish instead of passage of juvenile fish stocked above HHD. The FR/EIS should clarify that the Tribe considers overall existing project conditions, including the reservoir itself and refill operations, as an impediment to permanent recovery along with habitat loss basin-wide.

Page 14. The statement "*tribal and state fish managers have the most direct impact on the number of adult fish that spawn in the river and ultimately could spawn above the dam*" suggests that treaty and sport fisheries should bear the mitigation burden for upriver restoration associated with the AWSP. Flood control, storage and diversion impacts have an equally direct impact on the number of returning fish. The DFR/DEIS implication to further restrict tribal fisheries as a way to provide salmon for the areas above the HHD upriver escapements is inappropriate and contrary to the trust responsibility of the federal government to the Tribe. The Tribe historically has restricted its fisheries for conservation purposes, including halting all fishing of Green River chinook for four consecutive years. The Tribe is not eager to give up its meager remaining fisheries to accommodate the impacts of still another least-cost water supply development within its fishing area. Furthermore, the FR/EIS should recognize that salmon originating in the Green River are caught outside of Elliot Bay by international and other U.S. sport and tribal fisheries. By one estimate, 28% of Green River chinook are harvested by Canadian fisheries alone. The Tribe has made major investments to reduce interceptions of Green River fish, including a successful decade-long intertribal allocation case in the federal court system.

The narrative portion of the EIS typically overlooks the current and future impacts of the HHD upon the downstream transport of large woody debris. Sentences such as the following examples should be modified to include LWD impacts:

Page 16. *Specific factors that limit anadromous fish abundance in the Green River related to HHD are:*

Page 30. *Almost 50% of the watershed is above HHD and the dam traps a large amount of sediment.*

Page 159 *Other significant impacts to the river as a result of Howard Hanson Dam include 1)*

Page 207 *Dam and reservoir operations that effect flow releases and sediment transport ...*

Page 17. ... *comanaged by the WDFW and the Muckleshoot and Suquamish Indian Tribes.* Amend to read: ... comanaged by the WDFW, the Muckleshoot Indian Tribe and the Suquamish Indian Tribe.

Page 18. In discussions of fisheries management, use of Green River chinook stock data older than twenty years is not recommended. Stock data collected further back in time, while it presents an interesting history, is not relevant because catch of Green River fish were not specifically accounted for and escapement was not assessed with a consistent methodology as in more recent years. Implementation of treaty fishing rights in the 1970's marks the beginning of a period characterized by greater accuracy and consistency in estimation of catch and escapement. With few exceptions, sport catch is still not accounted for specific to the Green River, even when it occurs in the terminal area. The terminal treaty net fishery is the only fishery reliably able to collect data for evaluation. This fishery has collected 1500 tags, and a large number of scales and otoliths for evaluation purposes. Current Green River chinook management is based on passing 5,800 chinook to the spawning grounds. The run is comprised of both hatchery and naturally spawning chinook. The numbers of chinook expected to return to the hatchery and to the spawning grounds are determined by respective pre-season estimates. The number of chinook available for harvest is calculated by applying the harvest rate appropriate to the natural component to the combined hatchery plus natural run size. Typically, several thousand hatchery fish in excess of the hatchery escapement goal of 3,500 fish return to the hatchery. While attempts have been made to estimate the natural component of the run independently during conduct of an annual test fishery, no effective or statistically valid method has resulted. Straying of hatchery fish into the natural escapement is known to occur and clearly accounts for some of the difficulty encountered in forecasting hatchery and natural run sizes. The extent of straying is unknown and is a critical element in making future determinations about the status of Green River chinook. The FEIS should be updated appropriately.

Page 18. "*These harvest rates provide one more mortality factor influencing the number of adults returning to spawn that are required to maintain existing runs or that could be necessary for recovery and restoration of natural runs...*" The Corps' poor choice of words will tend to reinforce the unfounded, but wide spread belief that harvest and particularly the Muckleshoot terminal fishery, which is the bulk of the in-river fishery, takes most of the salmon produced in the Green River.

Page 18. It is unclear if the statement means that 90% of the coho that entered the Green River were harvested, or that 90% of the 90% of the coho originating from the Green River were harvested.

Page 18. It is unclear if the statement stating harvest rates in the Green/Duwamish River peaked in the 1980's refers to harvest rates for populations derived from the Green/Duwamish River peaked in the 1980's or that harvest rates in the river itself peaked in the 1980s.

Page 18, 48. WDFW has adopted the Wild Salmonid Policy through its Fish and Wildlife Commission. The tribes have not adopted what is intended to be a joint policy. The last sentence should be updated accordingly.

Page 19. : The Washington Forest Practices Act was adopted in 1972. The cumulative effects rule, which requires watershed analysis, or WAC 222-22, was adopted in 1992 and is part of the larger Act. Watershed analysis is a regulatory requirement. Watershed

Analysis produces prescriptions tailored to specific Watershed Administrative Units (WAUs), of which 5 are located in the project area. Watershed Analysis has been completed for only 1 WAU (Lester). Two more WAUs are still under review by the DNR. Two more WAUs are undergoing analyses at this time, however for these, the private landowners and TPU have failed to submit to the DNR proposed prescriptions to protect public resources.

Page 19 *This Act prompted watershed owners to form a watershed analysis team that established specific forest practices rules for the Green River watershed.* This statement is incorrect. See previous comments concerning Watershed Analysis.

Page 19 *The rules .... as well as provide guidance on riparian areas and identified sensitive areas, which are to be avoided by new road construction and during timber harvest.* There is no requirement under the current Forest Practices Act or Watershed Analysis to avoid road construction or timber harvest on unstable slopes or in riparian areas. The prescriptions allow road construction on unstable slopes following submission of an alternate plan. Furthermore, no WSA to date has produced riparian prescriptions that even approach that considered necessary to comply with the ESA. The Corps, though a landowner in areas covered by the ongoing Watershed Analyses, is not a regular participant at meetings that are preparing to propose prescriptions to protect existing salmon habitat and allow for the restoration of additional salmon habitat.

Page 19. The 3rd paragraph should be corrected to reflect the following : In 1994, the NW Forest Plan was adopted by various federal agencies and created the concept of the Snoqualmie Pass Adaptive Management Area. This plan and its Record of Decision modified the Mt. Baker-Snoqualmie (MBS) Forest Plan. The Snoqualmie Pass Adaptive Management area has its own plan and was likely adopted as a modification to the revised MBS Forest Plan...

Also, the DFR/DEIS is not current regarding the nature of the land exchanges. The land exchange with Weyerhaeuser is complete., occurring 5 months before the publication of the DFR/DEIS. Furthermore, the USFS is considering transferring much of the remaining Forest Service Land to the Plum Creek Timber Company. The impact of the Weyerhaeuser and PCTC land exchanges is that the bulk of the old-growth-mature and late seral timber left above HHD will be transferred to private entities that will harvest the timber and construct roads with considerable less environmental protections than those currently in effect on Forest Service lands. Federal lands enjoy a much greater levels of protection than private and state lands, yet even the standards of protection are federal land are not guaranteed to prevent a salmon run from being extirpated, let alone ensure harvestable numbers of salmon. Yet, now no-cut buffer widths that can exceed 200 feet could be reduced to as little as 30 feet. The old growth and late seral timber that will be harvest within a tree-height of the streams will reduce the rate of habitat recovery in the system and over the long term reduce the habitat quantity and hence salmon production. The extent to which the land exchanges will degrade the overall quality of salmon habitat above the dam and hence influence the salmon production estimates has not been quantified.

Page 34. The DFR/DEIS states that additional storage capacity is needed to augment flows in the summer and early fall for salmon and steelhead rearing, and that the Tribe has been a strong proponent of additional summer flows. However, the Tribe has voiced concerns about going beyond provisions to enhance summer/fall flows already made in the 1995 MIT-TPU Settlement Agreement in light of evidence that high spring flows are functionally important to salmon production.

Page 37. Table 2-1 is missing several other applicable federal laws such as:

Secretarial Order 3206, American Indian Tribal Rights, Federal-Tribal Trust Responsibilities and the Endangered Species Act.

Executive Order 12898 *Environmental Justice*

Executive Order 13007 Indian Sacred Sites

Executive Order 11593 Protection and Enhancement of Cultural Environment

Page 46. Despite refill strategies presented in the DFR/DEIS, we are concerned that adequate commitments have not been made to insure that the Phase I Preferred Alternative can meet the criteria "*water supply measures must avoid any overriding environmental problems*". Notwithstanding more cooperation and adaptive learning in recent years, reservoir operations involve conflicting objectives and often harm downstream fish resources. This problem is aggravated by a limited ability to forecast widely variable inflows and precipitation, and the fact that competing interests generally receive a higher priority than anadromous fish protection. The FR/EIS should specify what financial commitments will be made by each sponsor for improved staffing and forecasting and for reservoir operations, coordination, and streamflow management, and what commitments will be made to afford improved protection for anadromous fish including during times of water shortage.

PAGe 48, 117 *Habitat restoration measures upstream of HHD are dependent on providing adequate fish passage through the dam.* This statement does not follow from an analysis of the project goals and definition of success, which is based upon a 95% survival rate through the HHD, rather than absolute numbers of juveniles that reach the Duwamish Estuary. As mortality through the dam is density independent, then the number of fish that pass through the dam will increase with the number of fish hatched or planted above the dam, even in the absence of a new juvenile outlet through the dam. The Corps has failed to provide compelling evidence that natural production above the Dam, when all mortalities are factored in, will result in more juvenile fish reaching the estuary than current management practices.

Page 50. *Green-Duwamish River Ecosystem Restoration Team. A multi-agency panel participated in the formulation of habitat restoration measures with representatives from the USFW, USFS, MIT.* This sentence implies that the Tribe had greater involvement with the Restoration Team than occurred. The acknowledgment section in that report does not even list the Tribe as a major participant. The Muckleshoot Indian Tribe Fisheries Department (MITFD) was not granted the opportunity to review a draft copy of the Ecosystem Restoration Study and the MITFD's comments upon the incorporated King County document were not addressed by the Corps. Furthermore, the Tribe

believes that the HHD is greatly responsible for the lack of large woody debris in the mainstem of the Green River below HHD, an issue not explicitly addressed in the Green-Duwamish River Basin Ecosystem Restoration Study. Aerial overflights of the river show considerably more large woody debris above the Dam than below. Given the constrained nature of the Green River gorge and the extensive levee systems below Newaukum Creek, the area above HHD represents over 50% of the potential large woody debris contribution to the downstream reaches.

Page 55. Aquifer storage recovery of 20,000 ac-ft of Green River water in the Federal Way aquifers (*i.e.* the Oasis Project) has been proposed as a viable alternative to the AWSP. Engineering review has shown that this project has a high likelihood of success. This alternative should be discussed in the FEIS along with any technical analysis that indicates this alternative will not meet the water supply needs of the applicants.

Page 57. The DFR/DEIS narrative lacks a citation for the estimated 1 million salmon and steelhead smolts that could produced from the upper Green. Though, some citations are in Appendix F, the FEIS should also include the citations as previously suggested.

Page 58. Alternative 9B, Downstream Fish Passage at the Dam Without Water Supply, would result in the most successful ecosystem restoration short of dam removal, because it would limit the downstream effects of storage upon salmon and maximize in-reservoir migration if accompanied by careful refill operations and a new outlet facility. In tandem with the potential Oasis alternative , it could meet screening criteria for both water supply and restoration.

page 60... *not consistent with ecosystem restoration guidance or the Basin Restoration Project,* The section in the Basin Restoration Project supporting this statement should be clearly cited. Furthermore, there has been no official announcement that the Basin Restoration Plan is a document with which plans or proposals must be consistent.

Page 60. Discussions that refer to permanent and temporary supplementation programs should recognize that temporary and possibly permanent supplementation is a concurrent mitigation component for TPU water development impacts under the 1995 MIT-TPU ... Settlement Agreement and such supplementation may be required to address shortfalls in the restoration goal of self-sustainability and harvestability. Because of the AWSP impacts of reduced lower river flows during spring and the estimated 36% mortality rate on juvenile chinook passing the existing reservoir, restoring fish runs above HHD on a self-sustaining basis is questionable. Harvestable, self-sustaining runs of chinook below the HHD may not be feasible given habitat limitations, including the 97% of estuarine habitat.

Pages 61-62. It is unclear as to which Basin Analysis the DFR/DEIS is referring to in paragraph 2. The FEIS should quantify the amount of mitigation associated with the proposed habitat improvements, so that there is clear documentation that the improvements equal the extent of habitat impacts.

Page 63. As written, it is unclear as to whether or not if fish will be stranded as part of the sub-impoundments in Alternative 11C1. It should be stated in the EIS narrative that

Page 73. Demand management measures listed in Alternative 4A failed to consider to include water rate reform as a tool to reinforce conservation behavior and efficiency investments. Meaningful rate reform would include increased consumption prices, lower fixed monthly charges and higher summer seasonal rates. Because of this omission, the water savings estimated for Alternative 4A are very minor, amounting to less than 2% of the present TPU peak season system demand.

Page 74. It should be clarified that Alternative 7B , Mimic Natural Hydrology During Refill and Provide Low Flow Augmentation, is intended to address refill operations for M&I purposes as well as for low flow augmentation. Although the minimum baseflow targets of 575 to 900/cfs. offer improved instream protection compared to existing instream flow requirements, these targets are not guaranteed nor are they adequate to fully protect instream resources. For example, Green River Hatchery chinook smolt releases were found to have had higher survival to the Duwamish with increasing flow: only 40% survived at approximately 650 cfs. at Auburn, while survival rates of between 70 and 100% were observed at flows higher than 2,000 cfs. (Wetherall, J. A. *Estimation of survival rates for chinook salmon during their downstream migration in the Green River, WA.* PhD thesis, Univ. of Washington, 1971).

Pages 73-74. Alternative 4 A- This section describes varies actions that TPU could take to lessen demand and conserve water; however, the DFR/DEIS fails to disclose whether or not TPU intends to pursue any or all of these actions.

Page 74. Evaluation of water supply alternatives-The proposed economical analysis outlined in this section is incomplete. A better analysis would look also at the mitigation costs associated with HHD additional storage compared to the costs for the other viable water supply measures.

Page 79. The discussion regarding scientific understanding of fish passage needs provides examples of failed fish passage facility "experiments" over the last 40 years. While outlet design has been improved, it is difficult to predict how the proposed fish passage facility will perform in combination with added storage. It is reasonable therefore to assume that restoration associated with the Preferred Alternative is equally experimental.

page 85. *The restoration objective is consistent with state and federal requirements for ...and fits within the King County sponsored Green-Duwamish Ecosystem Restoration Study.* The project is not consistent with MIT requirements to restore salmon the quantity and quality of habitat in the Green River below the dams so as to increase salmon production. In order to achieve continuity with the federal final selection authority regarding criteria regarding acceptability of ecosystem restoration plans, the FR/EIS should specify what assurances will be made to insure that the ecosystem restoration plan is acceptable to the MIT tribal government as required in the criteria.

page 93. *...to have no net loss of lower watershed habitat while maintaining existing anadromous salmonid populations.* This conflicts with Tribal goal to increase habitat below the HHD. It is unclear why the project will not attempt to significantly restore

habitat downstream of the dam or will not attempt to restore downstream anadromous populations. Indeed, the DFR/DEIS (page 81) states *the reduced habitat capacity and habitat quality in the Lower river adds to the uncertainty of restoring fish runs in the Upper River.* Additionally, the DFR/DEIS (page 274 and 275) refers to *additional growth due to water supply resulting in habitat loss and fragmentation.* The potential impacts of this additional development upon salmon production below the dam, and the nature and uncertainty of such growth upon the potential of restoring salmon runs above the dams needs to be evaluated in the FEIS and factored into total habitat and production gains.

Page 89. Alternative 1B2 Gravel – On this page it is unclear if the 3,900 cu. yd. of gravel placement is a one-time or an annual activity that will occur over the 50 year project life. Furthermore, without an aggressive program to replace and grow LWD to assist gravel retention, it is unlikely that the full benefits of this mitigation measure will be achieved.

page 93 *Planning objectives... to establishing healthy, naturally reproducing, self-sustaining runs of chinook and coho salmon and steelhead trout;....* . There is considerable reference in the document to "self-sustaining runs". However, this term, "self-sustaining runs" does not appear to be defined, except by allusion to total adult production. Unless, the definition includes the provision of sufficient number of salmon for the treaty guaranteed harvest, the planning objectives fail to meet the treaty obligations of the federal government and additional mitigation would be required.

Page 96. Table 3-4. A note should be made for Section 1135 LFA to the effect that annual storage of 5,000 ac-ft is an option depending on adaptive management results, and that Phase II implementation is subject to consensus approval by the agencies and MIT.

page 101, 117 *The mitigation amount was dependent on defining the riparian area, the definition was provided from the Tacoma Forest Land Management Plan.* The definition should be provided in the EIS and the definition of riparian should be based upon definitions used the WDFW and the NMFS. Furthermore, the riparian areas should be specified in terms of a typical width of land paralleling a stream. It is essential to mention widths in the narrative portion of the EIS, as well as the Appendix, because the TPU definition of riparian zone if used in context with the descriptions for the Natural, Conservation and Commercial zones. Otherwise, the definition in the EIS could imply that any land landward of a road or powerline right away could be presumed not to be riparian habitat, even if that land could contribute large woody debris to the stream. Additionally, buffer widths for riparian mitigation projects should be stated, both, in absolute widths and the increase in width , if any, over the existing TPU Forest Land Management Plan. For example, a proposed mitigation or restoration buffer of 150 feet is not mitigation or restoration if the current management plan already calls for a buffer of 150 feet. Much of the riparian mitigation proposed for this project, appears to seek salmon habitat mitigation credit for actions that the current TPU Forest Plan states are needed to maintain water quality and quantity Furthermore, an unquantified amount of land owned by Tacoma is committed by contract for timber harvest. The FEIS should

clearly state which, if any, restoration or mitigation proposals, involve TPU obligated for timber harvest.

page 101. *It is expected that the proposed fish passage rate will allow a 95% survival rate of juveniles migrating through it. This is the survival rate considered necessary to accomplish the goal of a self-sustaining run.* The EIS should stipulate what is the required survival rate from spawning to passage through the HHD to ensure self-sustaining harvestable numbers of fish. Healey in Pacific Salmon Life Histories (eds C. Groot and L. Margolis) suggests that under natural conditions, 30% or less of the chinook eggs deposited result in emergent fry, or fry and fingerling migrants in the systems studied. Indeed, the literature values reported for chinook salmon spawning success, yield mortality rates of 40 to 96% for egg to emergence and 80- 89% for egg to fry/smolt. The literature also notes hat fry mortality rates during early rearing and outmigration can reach 70-90%. The literature values reported for coho survival from eggs to emergence are 1-27% for average conditions, and 65-85% for very favourable conditions. Using mortality rates provided in the literature and the DFR/DEIS, for egg to fry emergence, early rearing survival, current and postulated dam and reservoir mortality rates there is a considerable range of overlap between the no-action alternative and the preferred alternative regarding the total number of juvenile salmonids that reach the TPU Diversion Dam, due the much greater number of fry produced by a given number of eggs in supplementation programs compared to natural settings.

page 106. *Mitigation and restoration projects were developed and selected based on ecosystem or biological needs first.* The supporting narrative to this statement assumes that the restoration goals of the Corps, other federal agencies and that consistency with King County are more important than the restoration goals of the Tribe.

page 106. *Restoration measures must address overriding environmental problems, in particular, identified and accept aquatic habitat limiting factors. .....Mitigation and restoration projects must be ecosystem function or process driven.* The supporting narrative to this statement assumes that the restoration goals of the Corps, other federal agencies and that consistency with King County are more important than the restoration goals of the Tribe, some of which are expressed in these comments.

page 117 *Mitigation Features: These projects include maintenance of stream-corridor habitat within the inundation pool (13.3 acres) and management of riparian forest to accelerate succession on major streams above the project (10.3 acres) for a total of 121.6 acres.* The practice of thinning trees as a tool of riparian enhancement reduces the short to mid-term large woody debris recruitment into streams. This is an impact for which mitigation is required. The proposed width of stream corridors should also be specified. No mitigation credit should be granted for buffer widths less than those stipulated in the TPU Forest Land Management Plan or the WDFW Wild Salmonid Policy, whichever is greater for a respective stream type.

page 117 *reserving riparian forests at a ratio* of 5 acres reserved to 1 acre impacts. See previous comments concerning riparian issues.

page 135, 271 *Predator Monitoring and Evaluation - If there is an increase in the overall abundance in response to outmigrating presence a selective predator removal program*

can be initiated. The predator removal program must be coordinated through the City of Tacoma, and cooperating resource agencies. The proposed mitigation measure is speculative and TPU appears to have the power to veto such removal. Furthermore, predation can be increased without an increase in the overall abundance of predators. The monitoring plan must be able to determine if there has been an absolute increase predation without an increase in predator number.

Page 139. The section regarding riparian and stream improvements quantifies the acreage amount of stream and riparian habitat lost due to additional storage. However, it fails to quantify the type of habitat loss by examining existing stand conditions. If the inundated sites have mature forest conditions with large conifer trees and the proposal is to place wood of a smaller diameter and length, then there are additional impacts that should be mitigated.

page 139 *Site MS-02 Green River- Partial mitigation for riparian areas would be accomplished by 1) retention of existing trees along the riparian zones ....*This land is most likely within the Natural zone according to the definitions in the TPU Forest Land Management Plan and hence is not typically subject to harvest except major or minor to timber practices to improve water quality, water quantity or wildlife habitat. See other comments concerning buffers.

page 139. *While this habitat [tributary stream above HH1] is degraded from pre-management conditions, it is still considered highest quality habitat or has much greater recovery potential than much of the Lower Green River stream habitat.* See other comments addressing this issue.

page 140 *Site MS-08 The mitigation area on the mainstem Green includes stream buffers of 200 feet and protects a total riparian areas of 400 acres.* See other comments regarding buffers.

page 140. *Site MS-02* 140 *Site TR-01: Lower Bear Creek- This project will improve the stream channel by adding boulder or logs and includes limited excavation to recreate meanders or backwater habitat.* The number of logs to be added over the 3,000 feet of the project should be specified in the narrative portion of the EIS, as well as Appendix F. Additionally, the MTFD does not believe that adding boulders is mitigation for project impacts. Appendix F appears to suggest that more boulders will be added to the tributary streams, than LWD. The history of timber harvest has substantially increased the relative quantity of large boulders, while diminishing habitat formed by wood. Additionally, the value of boulders to providing high flow refuge habitat declines with increasing flow, while that provided by LWD increased to a threshold flow.

page 140. *Stream Habitat - Above Reservoir.* See other comments concerning mitigation.

page 141 *Site TR-09 ... 2) placement of one cluster of keystone logs in the North Fork channel* and page 141. *MS-08... addition of large keystone trees (60 feet or greater, 4-foot-diameter rootwad) attached) at one 2-3 tree cluster half mile of mainstem* Both projects involve placement of wood quantities well below Watershed Analysis standards for key pieces of LWD.

page 142. *TR-10 Headwater Culvert Replacement.* The provision of fish passage is a requirement of state law, hence no mitigation credit should be granted for complying with a law which mandates that passage be provided whether the HHD AWS Project is built or not.

page 146 *Environmental Restoration Features The objective of this measure is to address impacts from the original construction and operation of HHD.* The DFR/DEIS narrative however, does not consider all impacts caused by the construction and operation of the dam. The DFR/DEIS (page 47) relies upon the Green/Duwamish River Basin Ecosystem Restoration Study and states *"Basin analysis and interagency scoping has identified six aquatic habit-limiting factors or restoration issues that the HHD AWS can address"*. However, the DFR/DEIS (page 62) recognizes that the HHD traps LWD that would otherwise provide a variety of downstream biological and hydrologic functions. The NMFS also takes this position in regard to dams.

Page 147, 250. *Gravel Placement Gravel nourishment was identified as a necessary feature to maintain mainstem spawning habitat in the Lower Green River. ... The gravel will maintain an increment of existing spawning habitat in the Middle Green River and could help maintain and proposed side channel habitat mitigation projects. ... Because of the reduction in peak flows (with decreased sediment transport ability), gravel nourishment in the Flaming Geyser area is limited and will not equal the annual transport rate for the river (estimated range 3,900 – 11,700 cu yd3/year). The replacement value for this project is approximately 50% of the median estimated loss of sediment.* The term increment should be defined. It is unclear how one of the project goals to maintain downstream habitat will be realized if the inflow of gravel is half the loss. Indeed the quantity of gravel selected was not based upon ecological or salmon habitat considerations, but instead (page 89, 250) *the least cost level, 3,900 yd3, was selected as a final restoration measures.* Furthermore, the DFR/DEIS statements conflict with Tribe's goal to see a significant increase the quantity and quality of spawning habitat below the dams. Additionally, the FEIS should stipulated that it is important to spread the gravel out in the system to account for the 30 years of gravel deprivation.

Page 159. - The risk assessment referred to in the 3rd paragraph can be found within Washington's Dept. of Fish and Wildlife's DFR/DEIS for the Wild Salmonid Policy. This is not a National Marine Fisheries Service document as suggested here.

Page 171 *Table 5-1* There is no reference to the signing of the Treaties with Muckleshoot Tribe.

Page 189 *inflows to the Project above 60°F degrees occur in most years* and on page 191 that *water temperatures above 60° F are limiting for cool water adapted fish such as salmon and steelhead.* This is an admission that the summer and early fall rearing value of the mainstem is compromised by temperatures. Furthermore, the DFR/DEIS EIS (page 249) contends that *"very few areas in the Upper Green exceed 14°C"*. However, MITFD monitoring of streams has noted that following streams have been observed to exceed 16°C (60°F): Green, Sunday, Intake, Charlie, Tacoma, Friday, Cougar and Sylvester. Furthermore, two upper-watershed streams are on the Washington 303(d) list

for temperature impairment. The extent to which this has been factored into the Corps' estimate of salmon production is unknown.

Page 193 *Timber harvest has resulted in the predominance of second-growth .... The oldest stands are 60 to 80 years olds.* The young age of the trees along most of the riparian corridors above the HHD has a direct influence upon the rate of large woody debris input in the stream and the size of the LWD recruited, hence pool formation and gravel storage. Given that large scale recruitment of suitably sized large woody debris will not occur for many decades in the bulk of the harvested areas and that LWD is declining due to flushing and decay, the habitat quality will continue to decline for many years. The extent to which the proposed mitigation and restoration measures will compensate for the overall decline in habitat over the next few decades is unknown. Hence, any statements regarding salmon production over the next few decades are speculative. To achieve the DFR/DEIS salmon production goals, habitat above HHD will require a much greater degree of habitat protection than currently in place.

Page 201 *Substrates in the project are generally unstable in relation to biological value. Substrate stability is affected by changes in pool elevation and bedload shifts during periods of high flows.* These impacts will now occur in the new inundation area and adjacent areas. The extent to which this has been considered in the estimate of salmon production is suspect.

Page 203 *Federal, state, and tribal agencies manage Green River fisheries and fish habitat with cooperation from the Corps.* Though, the Corps is involved with the management of habitat, the Corps in not involved with fisheries management, which is the management of harvest.

Page 203. Competitive and predatory interactions between resident and anadromous fish in the upper watershed, including in the 3-mile reach between the TPU diversion and the HHD, may significantly influence the success of restoration efforts. The FEIS should include a discussion of the potential impacts of the large and established resident salmonid population upon juvenile anadromous survival.

Page 204. Summer and winter steelhead are actually reared at Palmer on the Green River. Steelhead fry planted in the upper watershed are native Green River stock. Except for chum and steelhead, all hatchery stocks were native Green River origin. Steelhead and chinook have been managed for natural escapement for the last two decades, while coho continue to be managed for hatchery fish.

Page 204. This section does not clearly acknowledge the Keta Creek Hatchery, operated by the MIT, nor the adjacent rearing ponds that the tribe maintains and operates for the state.

Page 204 There is no evidence that hatchery practices in the Green River have reduced the fitness of the chinook or coho.

Page 205 *WDFW spawning surveys (1987-1993) shows this sub-basin supports the highest density of natural spawning activity by anadromous salmonids (as indicated by*

redd counts). It is unclear if the term density means overall numbers, or number of redds per mile of stream channel.

Page 205 *WDFW spawning surveys show that chinook, coho and steelhead use parts of this sub-basin for spawning; however, this section [RM 46.5 to 61.0] contains more rearing habitat than spawning habitat.* MITFD helicopter surveys from RM 45 to 61 and float surveys from RM 61 to 56 for spawning chinook found high densities of chinook spawning. Recent, helicopter surveys show a considerable quantity of spawning occurs in the Green River Gorge (MITFD, unpub. data).

Page 206 ... *serves as a corridor*...The area also provide rearing habitat for juvenile salmonids.

Page 206. 1st paragraph- Very few chinook spawn in this river reach (RM 11-20) due to poor spawning substrate. Indeed, this reach is no longer consistently surveyed by the State or the Tribe due to the lack of spawning. This section of the EIS will need to be changed to actually reflect where chinook spawn based upon actual redd counts, not upon literature review.

Page 207. paragraph 3, 1st sentence, WDFW <u>and</u> the Treaty tribes evaluated stock status in the Green River. Amend to read, WDFW, the Suquamish Indian Tribe and the Muckleshoot Indian Tribe.

Page 207. Though chinook salmon were collected for GSI work in 1997 as part of a cooperative effort between the WDFW and the MIT, the FEIS should include the results of the GSI analysis, if the analysis has been completed. If the analysis has not been completed, the FEIS should so state.

Page 209. Table 6.1- The DFR/DEIS suggest that 9000 fish above Howard Hanson dam will be released. It is unclear how this number was derived and where these fish will come from. This table also suggests that large woody debris will be transported through the dam which is inconsistent with some of the other statements about large woody debris transport. It is unclear as to how the project will *subside* initial sliding events that affect long term turbidity levels. Also in Table 6.1- The DFR/DEIS fails to consider that potential impact to aquatic resources and water quality that may occur from chemical "fertilization impacts to localized areas".

Page 211. Chinook are assigned a "moderate chance" of becoming self-sustaining in Phase I. It is difficult to see how this conclusion is justified or conceivable given the low migration survival rate through the reservoir and dam.

Page 211, 215 state that chum and sockeye salmon did not historically exists in the project area. However, the US Army Corps of Engineers Green/Duwamish River Basin Ecosystem Restoration Study, pages 26 and 27, states that chum and sockeye salmon historically were found in the project area

Page 212. It is unclear in the DFR/DEIS at to how the 1 acre of side channel mitigation will offset the impacts of flooding 5.9 acres of stream habitat and 11.6 acres of riparian habitat.

Page 214- The DFR/DEIS fails to consider the potential for probable and significant adverse impacts to salmonids and other treaty resources and the potential impairment of the Muckleshoot Indian Tribe's treaty rights and the Tribe's treaty harvest of salmon, and the potential for this project to modify the escapement goal with resultant impacts to the Tribe's treaty harvest.

Pages 217-218. The DFR/DEIS fails to consider the potential for new growth and development arising from this project to adversely affect the water supply of the WDFW Green River and MIT Keta Creek hatcheries. Both of these facilities experience problems with water quantity and quality as a result of upstream development.

Page 225. If the process of passing only fine bedload material to downstream areas continues with this project as expected, then it is unclear how the proposed placement of 3900 cu. yd. of gravel will reduce or minimize the process of downcutting and bed armouring.

pages 277-229 In general, the site locations of historic and traditional importance to the Tribe should not be specifically referenced in public documents such as this DFR/DEIS so as to protect their location and identity. One such site of contemporary importance to the Muckleshoot people is locatable on a map from the published description referenced on p. 181.

Prehistoric sites of importance to the Muckleshoot Indian Tribe have been identified at and just below the existing water level at "elevation 1147 feet" as early as 1985 by Benson and Moura, who recommended at that time they be tested, evaluated, and data recovery made. ("An Archaeological Reconnaissance of Howard A. Hanson Dam Project" pp 36-38). This work, although required by Section 106 of the National Historic Preservation Act, was not undertaken at the time.

Again a decade later in 1996 pursuant to work for the present Additional Storage project, Larsen Anthropological and Archeological Services referred to the Benson-Moura work, the age of the sites, and compared them in age and potential importance to the comparable Chester Morse Lake sites. ("Cultural Resources Survey of the Additional Water Storage Project Area, Howard A Hanson Dam, King County Washington" at pp. 8-11.) LAAS has recommended that the Howard Hanson sites also be tested and evaluated, before elevation of water levels made data recovery tasks more difficult. The Muckleshoot Tribe made a formal request of the Army Corps of Engineers in 1996 that Section 106 procedures at 36 CFR 800.4-9 should be followed regarding these sites, in consultation with the Tribe.

The DFR/DEIS states, in regard to both the "no action" and "preferred alternative", that because the sites at issue lie below the 1147 foot elevation they would not be affected. Such is not the case, and this verbal construction cannot avoid the Corps responsibility under Section 106. The sites become increasingly difficult for archaeologists to examine, and would suffer further degradation from the increased water level. They remain within the area of affect for this federally licensed undertaking.

The Corps must finally fulfill its Section 106 responsibilities regarding evaluation and data recovery, in consultation with the Muckleshoot Tribe, for these important sites

of historic and cultural interest located at or below the current water level at Howard Hanson Dam. Such requirements are independent of agreements negotiated between MIT and Tacoma, and are among required mitigations of adverse effects for this project prior to implementation of Phase II referenced on p 229 of the DFR/DEIS.

Page 229. *"This is the alternative [Preferred Alternative: Phased Development With Environmental Restoration] the Tribe is expecting, though they have not formally accepted the project. .... It is expected that implementation of the preferred alternative would be acceptable to the tribe, with understanding that implementation of Phase II would be postponed until it could be shown that restoration and mitigation measures could offset the adverse impacts".* The writers of the EIS are presuming to have a knowledge of the policy positions of the Muckleshoot Tribe. Furthermore, it is the Tribe's understanding that Phase II would only be implemented with the unanimous consent of all the resource agencies, the Corps and the Tribe. Thus the DFR/DEIS statements misrepresents the position agreed to by the Tribe.

Page 229. *The No Action alternative may adversely affects Tacoma's ability to meet the terms of this agreement[MIT/TPU], and would strain the relationship between the MIT and Tacoma, as well as between MIT and the Corps of Engineers.* The DFR/DEIS writers presume to predict the how the Tribe would respond if the HHD AWS plan is not implemented.

Page 243. The discussion of wetlands fails to disclose that wetlands to be inundated may provide substantial overwintering habitat that may or may not be compensated for by side channel creation at Kanaskat.

Page 247 *Preferred Alternative: Water quantity and water quality in the lower river can limit anadromous salmonid production in most years* Tribe believes that a lack of habitat is a major factor limiting production in the system, not just water quality and water quantity. The impacts of reduced water quantity or magnified by the lack of large woody debris to create pools in which salmon rear and hold.

Page 249. *upper basin stream habitat is generally in good condition with percent pools ranging from 28-73%.* Howevcr, an analysis of MTFD data collected while surveying more than 15 miles of stream reaches in numerous streams above the HHD, data used as part of past and ongoing Washington State Watershed Analysis, found only 24% of the stream habitat is classified as pools with a standard deviation of 15%. Additionally, many of the pools and streams lack large woody debris. Juvenile salmon rearing habitat above HHD is extremely limited. Indeed, the lack of rearing habitat above HHD is known to the Corps which stated in its Green/Duwamish River Basin Ecosystem Restoration Study that *much of the upper watershed has been subjected to heavy timber harvesting and spawning gravels and pools have been damage.* This study also citing US Forest Service Watershed Analysis for the Green River above the HHD reports:

Of all the tributary habitats surveyed by the USFS (1996) in the upper basin, only Twin Camps Creek and Sawmill Creek were considered to have usable fish habitat. The other tributaries were ranked poor due to lack of pools, LWD, and or spawning gravels. The pools are spawning gravels are not maintained in the system largely because of the lack of LWD. Additionally, spawning gravels in some pools have been buried by fine sediments inputs from mass wasting or road erosion.

Page 250 *The second project is the collection, transport and hauling of large woody debris from the reservoir to the river below Tacoma's Diversion Dam for placement. The volume, timing, and placement of large woody would be adaptively managed based on the annual accumulation of large woody debris ... the final implementation of the truck and haul and placement of large woody debris would be dependent on developing a boater safety plan in conjunction with King County.* The DFR/DEIS narrative term placement of large woody debris implies that wood will be physically placed into a specific location, while Appendix F indicates much of the wood would be placed into the high flow of the channel and left to move. The FEIS narrative should clarify the proposed actions as though, some benefit will accrue from placing wood into portions of the river, over the long term, habitat quality and quantity will be improved if wood is placed into the river at the TPU Diversion Dam and then letting the river place the wood naturally. This will enable habitat restoration more consistent with the oft cited Green/Duwamish River Basin Ecosystem Restoration Study. Additionally, the DFR/DEIS proposed measures appears to be contingent upon the agreement of recreational boaters. Recreational boaters in King County have voice opposition to the placement of large woody debris into the Green River. If the Corps fails to implement the placement and release of LWD, then efforts to protect and restore salmon runs in the Green River will be compromised by the optional, recreational activities of a few people. Additionally, the statement on page 250 conflicts with that on page ...*to have no net loss of lower watershed habitat while maintaining existing anadromous salmonid populations* as well as the Tribal goal to increase the quality and quantity of salmon habitat below the Dams. It is also unclear why the Corps would in the interest of the recreational interests of a few allow the habitat quality downstream of the dams to degrade when the Corps (page 81) acknowledges the reduced habitat capacity and habitat quality in the Lower river adds to the uncertainty of restoring fish runs in the Upper River. Furthermore, a considerable quantity of large woody debris is needed in the lower reaches of the river to mitigate for the impacts that will arise from additional growth due to water supply resulting in habitat loss and fragmentation.

Page 250. 2nd paragraph. There may be an error in this paragraph. The last sentence should read 400,000, instead of 400,00.

Page 250. The discussion should indicate how only 3.2 acres of off channel mitigation can adequately mitigate for 8 miles of stream and side channel impacts.

Page 252-253. The DFR/DEIS implies that all salmonid species are likely to be equally affected by the project without any supporting information. Elsewhere in the DFR/DEIS, there are statements about some salmonid species (i.e. steelhead trout) being more affected than others. Such conflicting statements need to be resolved in the FEIS.

Page 258. The DFR/DEIS contends that that the enlarged reservoir constitutes mitigation and not an impact. However, information presented in the DFR/DEIS clearly indicates that lack of certainty in the purported benefits of the project.

Page 260 ... *it is uncertain whether chum salmon spawn as far as Kanaskat.* MITFD surveys during the chum spawning season found chum as far upstream as the surveys went the Icy Creek Rearing ponds. Given the lack of dedicated surveys for chum above Flaming Geyser Park and the statements in the US Army Corps of Engineers Green/Duwamish River Basin Ecosystem Restoration Study, chum use should be considered a high probability.

Page 265. It is possible that that the NMFS would not allow wild chinook above Howard, as allowing wild chinook allowed above the HHD would experience a higher mortality rate than exists below the dam and thus impede recovery. The DFR/DEIS should discuss the implications of this to project benefits.

Page 270. *The fish passage facility is considered a restoration and mitigation feature of the project.* The narrative justifying the distinction between restoration and mitigation is unclear and requires further elucidation.

page 271. *Evaluation of the adult returns of the CWT juveniles would be considered the responsibility of the WDFW and or the Muckleshoot Indian Tribe.* The applicants are attempting to get others to undertake the determination oft he mitigation and alleged restoration. The undertaking should be the responsibility of the applicants to fund and collect the data. Furthermore, project success is the successful exercise of treaty harvest.

Page 273. The discussion of cumulative impacts should include the effects of the TPU dam and first diversion water right, existing impacts of the Howard Hanson reservoir operations, and the effect of riprapping along the Green River in the upper watershed to protect the railway and roadways lying within the channel migration zone. The discussion of existing and potential future habitat degradation due to timber harvest activities in the upper watershed, appears to conflict with judgments elsewhere in the draft that the upper watershed habitat is of high quality.

Page 275. The DFR/DEIS fails to consider that the Endangered Species Act requirements for improved fish passage at the dams without additional storage should be discussed.

Page 278. The conclusions of the EIS could be interpreted to assume that the MIT has accepted the proposal. The Tribe has not accepted the project nor the alleged benefits of the project.

Page 278. Information in the DFR/DEIS does not support the conclusion that 9,600 acre feet of Phase II additional storage for summer/fall low flow augmentation will benefit anadromous fish given the trade-offs and uncertainties surrounding reduced spring flows.

APPENDIX F1

F1- Page 5. The discussion and identification of the "two main competing hypotheses" regarding life history limiting factors is vastly oversimplified and fails to address the need to develop explicit hypotheses about how the system functions. This Appendix should be revised to reflect the more complex concepts of sequential habitat availability and limiting factors expressed, for example, in the 1996 Independent Scientific Group report *Return to the River* and included in the narrative portion of the FEIS. It should also address the concepts raised by Poff et al. in *The natural flow regime: a paradigm for river conservation and restoration* (BioScience, December 1997.

F1-Page 15. The adult return rate study failed to distinguish between fish emigrating in spring versus those emigrating in fall. Conclusions about the future condition under AWSP cannot therefore be made. Studies in Duwamish estuary show that more fish from above HHD are caught the year after release than the year of release for all species.

F1- Page 17. The results statements imply that the smolts were closely associated with wood, when only the presence of radiotags themselves were confirmed to be located near wood in proximity to loon and otter inhabitants. Most of those tags that were associated with wood remained stationary, suggesting that the tagged fish had been consumed by avian and mammal predators. The report should discuss the alternative analysis and conclusions presented in the paper *Travel time and residualism of juvenile coho salmon, chinook salmon and steelhead trout migrating through Howard Hanson Reservoir, King County, WA: An analysis of Mobile tracking and fixed receiver data*, E. Warner, MIT Fisheries Department July 19, 1997.

F1- Page 78-79. The comparison to smolt production estimates in lakes is inappropriate because unlike in most lakes, the Howard Hanson reservoir is drawn down dramatically every year to elevation 1070 ft. Furthermore, any smolts surviving year round are likely to be significant predators on other fish.

F1-Page 84. The water particle travel time estimates provided are misleading and oversimplified as they assume equal inflow and outflow and a uniform reservoir width. These assumptions are not consistent with spring refill or the shape of Howard Hanson reservoir. A large back eddy is created during refill that is compounded by the reservoir narrows at Eagle Gorge (see Warner, 1997).

F1-Page 94. The discussion of reservoir size fails to recognize the greater influence of refill rate and inflow/outflow on fish passage.

F1- Page 131. Conclusions drawn from comparison of Howard Hanson Reservoir to Lake Washington are especially weak as the discussion failed to consider differences in refill rate and water residence time. Additionally, residualization of coho and chinook has been observed in Lake Washington as well.

F1-Page 169. It should be noted that the outmigration timing data presented is for hatchery plants. Natural or wild fish, especially wild chinook, could be expected to have

sentence is that *full mitigation will be achieved.* Less than full wildlife habitat mitigation is unacceptable and does not comply with the Tribe's goals for wildlife.

pg. 142 *Elk Forage Habitat pastures* For reference and clarity there should be a restatement of exactly how much of each habitat type is inundated for each Phase. . For example, it is unclear how large MacDonald Field is.

pg. 142 *Elk Forage Habitat* Burning should also be considered as an additional pasture management tool.

pg. 142 *Phase I Mitigation* Sites 1 and 2 may not be used by elk displaced from MacDonald field.

pg. 142 *Phase I Mitigation* Elk currently use the powerline area which has been proposed for elk forage habitat mitigation (Sites 1,2,7,8). Thus, the loss of open pasture is not being actually replaced with open pasture but simply with potentially better forage (As stated in F2-18). A detailed forage analysis needs to be conducted on all sites proposed for forage habitat enhancement to verify that the proposed management activities will result in better and more forage than currently exists on those sites at all times of potential use. The amount of new forage (e.g., in DDM units) on the proposed mitigation sites *must* be equal to what presently exists on those sites *plus* an added amount to compensate for the loss of forage through inundation.

pg. 142 *Phase I Mitigation* An additional consideration for ecosystem restoration that should be tied to this proposed project is elimination or reduction of scotch broom throughout the entire watershed, especially in potentially important elk foraging areas under powerline right-of-ways.

pg. 145 *Phase II Mitigation* The Phase I elk pasture mitigation results must first be assessed on their effectiveness before Phase II is implemented. Phase II should be proposed under a separate EIS after the results of Phase I have been analyzed.

pg. 157 *Staffing* Is all of the proposed wildlife mitigation practical? What added staff are needed to fully develop the wildlife mitigation sites and what is the certainty they will be hired to implement and monitor the mitigation proposals?

pg. 196 *Cougar (Felix concolor) are also numerous.* Black bear (*Ursus americanus*) are also quite numerous.

pg. 197 *WDFW estimates 590-650 elk within the watershed each year.* This comment needs to be cited or supported by information from studies conducted within the watershed. A more recent 1997 report available from WDFW indicates an elk population of only 200-300 animals.

pg. 197 *A tribal subsistence hunt...* The elk hunt in the watershed was canceled in 1997 and again in 1998 and will be closed until the elk herd rebounds and productivity increases.

pg. 197 *Black-tailed deer ... their numbers are estimated to be similar to black tailed deer populations in surrounding areas.* Numbers depend on size of area. What is probably meant here is *density* not numbers. The habitat potential may be similar to

surrounding areas, but due to protection of bear, cougar, and coyotes, predation has likely resulted in lower density of deer than surrounding areas.

pg. 198 *Cougar* The WDFW *was* involved in a cougar study which has ended. The stated estimated number of cougars is well beyond current estimates and what the available prey base can support.

pg. 198 *...the large stable elk herd...* The elk herd has declined from 600+ to 200+ in 3 years, which can be hardly called stable. The Corps biologist recently attended a meeting on the status of the Green River elk herd. Cross-check comment with that on pg. 244.

pg. 243 *Inundation of roughly 12 acres of grass meadows and up to 90 acres of emergent wetlands would result in loss of these forage areas. This loss represents approximately 56% of the foraging habitat for elk near the reservoir.* With a loss of 56% of the habitat in the area, will the mitigation meadows replace this habitat completely? Also, any evidence that elk will use these areas that are scheduled to be replanted and re-tilled each year should be presented.

pg. 244 *Migration corridors often follow shorelines.* If this from a study that was conducted, it should be cited. We can not determine from the EIS that the created shorelines will be effective corridors for the elk. Again, the MIT elk study will shed light on migration patterns.

pg. F2-6 *Existing Wildlife Resources.* It would help if these species were listed in a table and *a + or – or =* used to identify how each species might be affected by various alternatives with and without wildlife habitat mitigation.

pg. F2-9 *Phase I 281 acres and Phase II 161 acres* The current MIT-TPU agreement provides for tribal ceremonial hunts. Watershed inspectors have interpreted this to mean ceremonial hunts shall occur on City of Tacoma lands and other open and unclaimed land. The loss of 442 acres of terrestrial land base during inundation only reduces the amount of area possible for conducting ceremonial hunts. TPU shall facilitate landowner agreements to provide access to other lands while conducting tribal ceremonial hunts.

pg. F2-18 *...assumed elk meadows can be established which are more than twice as productive than existing right-of-way...* It would help if there were data to back up this statement. Will *twice as productive* be enough to offset losses from inundation? Although created pastures may be twice as productive as natural openings, how do they compare in forage quality? Data may be collected to assess elk nutrition and habitat use in the ongoing MIT elk study.

pg. F2-18 *Several different mixes will be tested prior to the pool raise to determine which species are most preferred by elk.* True forage *preference* studies are hard to design and interpret. MIT wildlife biologists expect to be included in discussions of forage species considered and studies to assess which are "preferred".

pg. F2-18 How might the elk pasture productivity and resultant availability to elk for winter forage be affected by increased rodent or insect populations associated with the pastures?

pg. F2-20 *At each site, shallow marsh vegetation would be developed...* The proposed sedge plantings as mitigation for loss of elk forage habitat (sites 16, 22,23,24,25) without reference to forage value and palatability to elk is misleading. Is there documented use of these sedge species by elk? These plantings, however, may provide some benefits to other wildlife.

pg. F2-23 *Phase 2 would... inundate the 4 acres of sedge planted for Phase 1 emergent wetland mitigation.* It would be cost-effective to delete these 4 acres from being planted initially due to imminent inundation with Phase 2.

pg. F2-35 *Tame Pastures receive tilling and seeding over 25% of pasture each year, and fertilizer each year.* This is not accounted for in the cost analysis within the Appendix. The costs accrued for tilling, seeding, and fertilizing each of these parcels for the next fifty years needs to be listed within the cost analysis. Is there an indication of the effects on elk that may be resident or transient within the fields that are being cultivated? What time of the year will this be occurring - cultivation of the fields may coincide with calving and, thus, disrupt the calving process. The MIT elk study will yield data on timing of migration and calving.

pg. F2-43 *Pasture sites were selected on the following criteria...* Relative distance to roads, especially main roads within the watershed, is not mentioned. Was this considered as a disturbance factor?

pg. F2-43 *site 1 will merely be screened from a road by trees on one side* The road being referenced needs to be stated. Also, will there be mitigation factors included for potential deaths due to a foraging site being placed next to a road?

pg. F2-44 *Several mixes of pasture grasses will be tested on several plots of existing pasture two years prior to the pool raise. The best performing mix will be selected for mass seeding on the newly created pastures.* Are the mixes preferred going to be altered for each site depending on the surroundings and soil. It would seem logical to evaluate the site and then chose from a variety of preferred mixes. Also, will the preferred mix be chosen depending on the availability of nutrients in that area, and whether it is a summer or winter range? Preferably the winter range sites would be planted with species that are higher in available nutrients.

pg. F2-44 *Existing roads adjacent to the created pastures will be screened with shrubs and low growing trees to provide elk with some privacy while grazing.* This sentence is repetitive, and vague as to explaining which species of trees and shrubs will be planted. Are the species to be planted considered as forage for elk?

pg. F2-44 *some of the older mixed and coniferous forests will be managed to 'accelerate' the maturity of the forests to mimic conditions found in very mature forests.* How is this process conducted, i.e. tools, materials, length of time. What are the techniques used to promote this acceleration, and is this accounted for in the cost analysis section?

pg. F2-45 *forage availability is considered to be a limiting factor within the vicinity of the reservoir* Cite reference to this statement.

pg. F2-45 *The HSI's are relatively generic in the sense that they do not look closely at the species of grasses and other herbaceous plants available for forage, nor at the percent cover of these plants. Rather, the HSI's are based on factors such as whether the site is fertilized, seeded, and otherwise treated at frequent intervals.* An explanation of whether or not a HSI determination may be made with so few factors needs to be included. Also, cite other studies that have been conducted that used a small sample of HSI's. Pasture treatment is not a viable factor if the species of grass being treated is not known as plant species respond differently to treatments. The percent of cover may also determine the viability of species within the area.

MUCKLESHOOT INDIAN TRIBE

FISHERIES DEPARTMENT

30 November 1998

Ms JoAnn Duman
US Army Corps of Engineers
Policy Review and Analysis division
Kingman Building, Fort Belvoir
VA 22060-5576

RE: FINAL FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT FOR ADDITIONAL WATER STORAGE PROJECT HOWARD HANSON DAM, GREEN RIVER, WASHINGTON.

Dear Ms Duman:

The Muckleshoot Indian Tribe Fisheries Department has reviewed the Final Feasibility Report (FRF)/Final Environmental Impact Statement (FEIS) for the Howard Hanson Additional Water Storage Project (the Project). The FFR/ FEIS has responded to and answered some of the Tribe's questions. However, many critical questions remain unanswered. Therefore, the stated benefits and impacts of the project require additional analysis.

Some of the major concerns with the FFR/FEIS include unclear assumptions, using old reports and literature, and measuring success as a rate of juvenile survival, rather than absolute numbers of juvenile that survive. Indeed, the Corps is basing production estimates above Howard Hanson Dam (HHD) upon comparisons to other areas, supplemented by old data specific to the Green River. Using relative area to determine estimated production is only valid if the life history survival rates are similar for all life stages among the areas. No evidence has been presented to support this contention. Furthermore, the FFR/FEIS will evaluate the success of the Project by the survival rate of juvenile salmonids through the Project, rather than taking the number of juvenile salmonids that exit the Project area post-project and comparing it to pre-Project numbers under the current juvenile salmon planting program. Furthermore, the FEIS has implied that plants of juvenile salmon above the HHD will cease unless the Project is approved. At this time, the Muckleshoot Tribe does not intend to cease planting juvenile salmon above the dam whether or not if the Project is implemented. Therefore, the FFR/FEIS has failed to sufficiently consider relevant factors that will influence the cost and benefits of the Project. Additionally, as these same assumptions form the basis of information used to prepare the Fish and Wildlife Service Coordination Act Report, the Coordination Report should be independently reviewed.

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This cover letter highlights several of our concerns, while the attached appendix fleshes out many of these concerns. In many cases, the extent to which our concerns may have been addressed in the FFR/FEIS is unknown. The FFR/FEIS (page 3) notes that changes to the DFR/DEIS are incorporated through the responses to public comments found in the revised Appendix 1. However, it is unclear whether a comment is considered incorporated or not, when the FFR/FEIS response is "comment noted". The uncertainty of incorporation through response is amplified when the Corps states that, "*by reference to this document, the following text provided by the MIT is included in the FEIS*".

However, rather than reiterate much of our commentary previously provided in response to the DFR/DEIS, I encourage the Corps to read the entirety of the Muckleshoot Tribe's comments and the applicable responses in the FFR/FEIS. Such a reading will find that many of the answers given in the FEIS do not address our questions, or if they do, only narrowly. Such a narrow response and consideration overlooks environmental conditions and potential for impacts that could substantially alter the salmon production estimates attributed to above the HHD.

If you have any questions concerning this letter please feel free to contact Chantal Stevens, Environmental Division Manager or myself. I thank you for your attention to our concerns.

Sincerely,

Isabel Vinego
Director

att: 3

cc: US Army Corps of Engineers, Seattle District
National Marine Fisheries Service
US Fish and Wildlife Service
Tacoma Public Utilities

COMMENTS UPON THE FFR/FEIS FOR THE ADDITIONAL WATER STORAGE PROJECT HOWARD HANSON DAM, GREEN RIVER, WASHINGTON.

Numbers, such as T01-3, refer to the Corps' numbering system in the FFR/FEIS response to comments.

T01-3/T03-20/T03-70/T03-96

The Corps' response to issues raised in the Muckleshoot Indian Tribe's (MIT) comments on the DEIS have not been addressed. The FEIS has failed to adequately consider the federal actions proposed at Howard Hanson Dam (HHD), in context of past, ongoing, and probable future federal actions, particularly in regard to land exchanges and Habitat Conservation Plans that will influence habitat forming processes for a minimum of 50 years. By not analytically considering actions that will influence the quality and quantity of habitat above HHD, the Corps has failed to consider the specific and cumulative impacts of such federal actions upon the ability of the basin above HHD to support salmonids. Instead, the FFR/FEIS has avoided a thorough discussion through a broad, sweeping statement that things will get better due to improved habitat management in the future. Furthermore, the FFR/FEIS has failed to illustrate, beyond a statement, that *"inaccuracies, inconsistencies, assumptions and misrepresentations"* in the DEIS are simply differences of profession opinion.

For example, the FFR/FEIS characterization of the riparian standards for the Plum Creek Timber Company (PCTC) Habitat Conservation Plan (HCP) is simplistic. The FFR/FEIS response would lead the uniformed reader to assume that Type 1 through 3 streams would have 200 foot buffers, and Type 4 streams 100 foot buffers, when if fact they do not. For Types 1 through 3 streams, there is a 200 foot riparian habitat area (RHA) or in common parlance a riparian management zone (RMZ). Of this 200 foot RHA, only the 30 feet closest to the stream channel is a no harvest zone. Up to 50% of the merchantable wood can be removed from the remaining 170 feet of the RHA. All of 100 foot RHA of Type 4 streams is open to harvest, with only simple requirements for leaving some trees. Furthermore, the FFR/FEIS cites PCTC as stating that this RHA will provide "*in most instances, up to 100 percent of the large woody debris inputs that occurred under natural conditions*". The FFR/FEIS has expanded this statement to beyond what is scientifically defensible. The actual sentence in the PCTC HCP reads " *by providing at the equivalent of at least one tree height of protection for fish-bearing streams, litter fall and stream shading will be fully maintained, and the 200-foot RHAs are expected to provide, at a minimum, 85% percent, and in most instances, up to 100% of the woody debris inputs that occurred under natural conditions*". The Plum Creek wording is restricted to the provision of large woody debris from the adjacent riparian

corridor. The statement can not be interpreted to mean, as the FFR/FEIS implies, that total large woody debris recruitment potential into the streams as derived from both adjacent, upstream and upslope sources will in most instances equal 100% of natural conditions. The Corps is referred to the National Marine Fisheries Service (NMFS) 1998 document, *A Draft Proposal Concerning Oregon Forest Practices. Portland, Oregon* to the State of Oregon Coastal Coho Plan for a detailed discussion of this issue[1]. Attached are extracts from that document.

Additionally, the FFR/FEIS has stated that the United States Forest Service (USFS) has implemented large buffers on their lands. The FFR/FEIS response to the Tribe's comments upon the DEIS completely ignore the fact that much of these lands will be traded to private timber companies, where RMZs of less than 100 feet, and often less than 50 feet, are common. Almost all the lands managed under standard Washington Forest Practices Rules or by PCTC HCP do not, and will not, meet the Properly Functioning standards expressed by the NMFS[2]. in a matrix of pathways and indicators (attached). Indeed, the bulk of the lands fall into the At Risk and Not Properly Function categories. Thus, it unclear why the FFR/FEIS maintains that the effects of federal actions that result in habitat conditions that fail to produce Properly Function conditions are *"unquantified and difficult to address in regard to specific impacts to salmonids"*.

T01-07. The FFR/FEIS has overlooked that fact that much of the Green River above River Mile 34 is not confined by levees and is free to move. To maintain an objective discussion the Corps should avoid referring to a generic lower Green River and instead discuss segments based upon current conditions. For example, some reaches of the Green River which the Corps has implied have little hope for restoration support larger numbers and densities of spawning chinook than reaches less touched by development.

T01-10. As the FFR/FEIS notes, it is true that the stream and floodplain habitat above HHD have not been extensively hydromodified by water control structures, extensive levees, or by urbanization. However, the area above HHD has been extensively hydromodified by road and railway construction within the floodplain; many miles of stream habitat are blocked by culverts; miles of salmon bearing streams have been obliterated due to debris flows attributed to forest management actions; and streams have been logged to the edge. Over the 100 years or so required for natural habitat processes to restore, the impacts of such actions, are just as pervasive and injurious as similar impacts in urban and urbanizing areas.

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1 National Marine Fisheries Services. 1998. A Draft Proposal Concerning Oregon Forest Practices. Portland, Oregon.

2 National Marine Fisheries Service. 1995. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale.

T02-1 The FFR/FEIS states that the "*proposed listing of chinook salmon in Puget Sound by NMFS underscores the potential benefits of extending the range of anadromous species to historic habitats*". An alternate view is that given the Corps' statement with regard to achieving self-sustaining runs "*there is greater uncertainty for chinook relative to other species*" and that potential juvenile chinook mortality as high as 30% will occur though the project alone, it is possible that the NMFS would not allow the planting or transport of chinook above HHD. The FFR/FEIS has assumed the adult chinook will be placed above the HHD as a benefit of the project. If such placement does not occur, much of the benefits attributed to the project will not occur.

T02-3. The FFR/FEIS did not respond to the issue raised by the Tribe, but instead reiterated survival rates through the Project. The FFR/FEIS should explicitly state the anticipated fecundity and egg to emergent fry survival and then from emergent fry to pre-smolt or migrating fry, rather than rely upon a single value for egg to pre-smolt or migrating fry survival. As it is unclear from Appendix F2, Section 8E exactly what values the Corps used to determine the anticipated fecundity and the anticipated egg to emergent fry survival for coho, chinook, and steelhead, it is impossible to determine the extent to which the assumptions in the production model influence the range of potential outcomes. For example, an analyses of the coho fecundity in the Green River shows a 30% decline in eggs per female[3]. Estimates of smolt production based upon documents which estimated coho production and escapement when fecundities were higher must be carefully considered. Similarly, given the range of fecundities between stocks, production estimates upon the number of smolts or fry produced, assuming equal numbers of spawners and equal habitat conditions, can range widely. The FFR/FEIS has not given sufficient weight to such issues.

The Corps' response notes that pool frequencies for the Green are higher than in some other systems, but the observed values are not presented. Narrative responses without numerical data are difficult to judge, and do not generate confidence in the response.

The FFR/FEIS notes that *ongoing timber harvest is controlled by state and federal guidelines*. This implies a level of protection of salmon, salmon habitat, and salmon habitat forming processes that does not exist. For example, standard Forest Practice Rules do not meet the Washington State DNR Watershed Analysis definition of prevent and avoid injury to pubic resources such as salmon[4]. Hence, any timber harvest above HHD in accordance with standard rules can not be presumed to protect salmon habitat or the processes that create salmon habitat. The issue of lands covered by the PCTC HCP has been previously discussed. Furthermore, as large woody debris loadings in streams

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3 Roderick Malcom, 1995. Analysis of the Current Coho Escapement Goal for Above the Soos Creek Hatchery: the Potential for Additional releases above the Hatchery Rack. Muckleshoot Indian Tribe Fisheries Department. Auburn, Washington.

4 Letter from DNR to Clearwater-Middle White Prescription Team, dated 27 March 1998.

have been observed to decline for 100 years following timber harvest[5,6], given the time frame during which much of the harvest occurred above HHD, it is probable that instream habitat quality will continue to decline for a further 50 to 100 years, before natural processes can begin to reverse the decline in large woody debris. The instream habitat restoration and mitigation programs to be implemented as part of the PCTC HCP and the HHAS project have been assumed to complement the existing wood loadings, and hence be an improvement. However, no evidence has been provided that the proposed rate of placement of large woody debris will exceed the rate or removal and decay over the time period that large woody debris quantity in the streams is expected to decline.

T02-4/T03-24/T03-35/T03-52/T03-71/T03-77/T03-78/T03-80/T03-84.

Though the FFR/FEIS has described several methods (Appendix F1, Section 2.A) to determine smolt production, it does not does not describe the similarities between the basins or the differences, and hence the potential range of influence upon the estimated production estimates. Furthermore, the FFR/FEIS does adequately acknowledge the TFU can restrict the number of salmon allowed to pass above HHD on the grounds of water quality or requirements of the "Safe Drinking Water Act" i.e. another federal law/policy not adequately considered in the analysis.

The production estimates in the FFR/FEIS rely upon comparisons to other systems or upon data generated by other systems or old reports to generate information. Furthermore, the FFR/FEIS has not given sufficient weight to the quality of habitat in influencing the production estimate. For example, page F1-137, in regard to smolt production states "*these estimates were based on a measurement of existing stream habitat (post-dam quantity, with no assumption of habitat quality*". Such a statement, ignores differences in egg production between stocks and the extent to which different fecundities have been considered is unclear. The problems in using old reports or old methodologies are illustrated in the Muckleshoot Indian Tribe's Fisheries Department's (MITFD) reworking of the coho goal for Soos Creek, a goal specified in Zillges (1978), a report cited by the FFR/FEIS. As previously mentioned, the MITFD found that egg fecundity had dropped 30% at the Soos Creek hatchery between 1977 and 1994. Additionally, though the Corps claims that substrate stability has been included in the smolt estimates from Appendix F, no narrative can be found as to how it was considered in the non-inundated reaches. If gravel instability or scour is greater in the Green than in the more pristine systems used to generate

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5 Murphy, M.L. and K.V. Koski. 1989. Input and depletion of woody debris in Alaska streams and implications for streamside management. N. Am. J. Fish. Manage. 9:427-436.

6 Harmon, M.E. and 12 coauthors. 1986. Ecology of coarse woody debris in temperate ecosystems. Adv. Ecol. Res. 15: 133-302

production estimates for the Green, then the production estimate for the Green, and thus the touted benefits of the project, will be too high.

Furthermore, no detailed surveys for natural impediments to the upstream migration of adult chinook have been conducted in the mainstem of the Green River above HHD[7]. The FFR/FEIS estimate of accessible habitat was predicated on the assumption that existing maps would denote the presence of natural barriers to the upstream movement of chinook. However, small steep gradients of the stream channel that are passable during medium to high flows, can be difficult to navigate at the flow levels experienced by chinook during their upstream migration. Near the end of August 1998, a visit by representatives of the MITFD to above HHD noted a series of impediments to the upstream migration of adult chinook. These impediments took the form of extensive areas of shallow, less than 2 inches deep flow among cobble as well as shallow white-water among cobble, and sharp breaks in stream gradient. Often, these areas were associated with sharp breaks in stream gradient with the stream rising 1 to 2 feet over a distance of 2 to 4 feet, without pools for jumping from at the downstream end. The combination of very shallow flow and short, steep sections would impair the upstream migration of adult chinook, especially at the end of the long, energetic expensively journey to reach the upper watershed. Furthermore, the stress encountered dealing with shallow flows in a cobble matrix would be compounded by river temperatures that could exceed 60°, a temperature exceeding that stated by the Corps as being in the range for chinook spawning (Corps response to MITFD comment upon DEIS page 249). The FFR/FEIS (page 189) notes that inflows to the HH reservoir often exceed this level in most years. However, the FEIS has limited its discussion of temperature impacts to the reservoir, and not discussed cumulative impacts of elevated temperatures and difficult swimming conditions to upstream migrating chinook *above* HHD.

In 1998, the MITFD use a global position system to map the location of chinook redds in the Green River between 33.8 and 43.8. This is the first time, the positions of chinook redds have been accurately located, rather than relying upon the number of redds in a survey reach to locate peak spawning areas. The map showed that chinook redds were not uniformly distributed in the survey reach, but clumped into 5 to 7 locations[8]. Redd superimposition was frequently observed, suggesting that the chinook were avoiding spawning in large portions of the river and concentrating spawning in response to undetermined environmental factors. Given the non-random distribution of spawning chinook in the middle part of the Green River, despite the wide spread availability of suitably sized gravel, any extrapolation of spawning densities to above HHD is tenuous.

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7 pers. comm. between Paul Hickey, TPU and Roderick Malcom, MITFD on 28 August 1998

8 MITFD, report in preparation.

T03-1 The FFR/FEIS response to the MIT comment, which used specific passages as examples of the problem, was to reply to the specific examples, rather than deal with the comment the many of the citations used in the DFR/DEIS narrative are secondary citations, rather than primary citations and additionally, many statements presented as fact or well founded conclusions lack supporting citations. As changes to the DFR/DEIS are incorporated by responses to public comments found in the revised Appendix I, reviewers of the FEIS will be unable to determine which statements in FEIS are supported by the literature, without referring to Appendix F.

T03-1 It is the understanding of the MITFD, that the Washington Department of Fish and Wildlife (WDFW) has conducted aerial spawning surveys in the Green River Gorge, prior to 1997. The FFR/FEIS also notes that a 1929 letter states that there is limited spawning in the Gorge. Given, the six decades that have passed since the letter was written and the dynamic nature of salmon habitat, more recent references should have been stated. Furthermore, the FFR/FEIS position is not supported when the WDFW spawning surveys are thoroughly analyzed. Based upon redds observed from helicopter surveys jointly conducted by the MITFD and the WDFW, approximately 20% of the chinook observed spawning in the mainstem of the Green River in 1998 were found spawning in or above the Gorge, the area presumed to have low spawning value. Flows in 1998 were very low and prevented many fish from migrating upstream. Additionally, the WDFW[9] stated that large numbers of dead chinook were found upstream of the Gorge and it was believe the mortality was tied to the stress of upstream migration during low flows in August and September in 1998. Also, the first chinook redds observed in the Green River in 1998 were found in the Green River Gorge on 9 September[10]. For 1997, the WDFW (unpublished data) places the total percent of the chinook run that spawns in the reach from within the Gorge to the TPU Diversion Dam at approximately 34%. This reach is 13.8 miles long or approximately 40% of the surveyed part of the River. Conditions for viewing chinook redds in the Gorge are less suitable[11] than in the lower parts of the river, hence the probability that redds have been overlooked increases. Furthermore, the ten mile reach most centered on the Gorge contained 23% of the mainstem escapement. The proportion of redds in this reach, does not support the Corps' contention that spawning is limited in the Gorge.

See also response to T02-4

T03-5 The correct page number in the Tribe's comment should have been DEIS page 189. However, a correct page number was not essential to the FFR/FEIS formulating a reply. The MIT response was clearly dealing with water quality and listing two streams that exceed state standards for temperature. The FFR/FEIS response to T03-1 overlooks the fact that both Smay and Gale

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9 pers. comm. between Steve Foley, WDFW and Roderick Malcom, MITFD, 21 October 1998

10 pers. obsn. Roderick Malcom, MITFD.

11 pers. obsn. Roderick Malcom, MITFD.

Creeks are on the 303(d)list. As noted in the MITFD response to T03-1 the Corps has limited the EIS discussion of temperature impacts to the reservoir, and not discussed cumulative impacts to upstream migrating chinook once they are *above* the HHD. Again the quality and quantity of habitat above the reservoir has the potential to significantly limit the perceived benefits associated with this project.

T03-08/T03-12

The FFR/FEIS response to these questions has not addressed the issues raised by the MIT that the Corps' poor choice of words will tend to reinforce the unfounded, but wide spread belief that harvest and particularly the Muckleshoot terminal fishery, which is the bulk of the in-river fishery, takes most of the salmon produced in the Green River

T03-17. The FFR/FEIS response is predicated upon the uncited statement of a watershed owner. With the exception of the Lester Watershed Administrative Unit, no prescriptions have been approved for any of the Watershed Administrative Units (WAU) above HHD[12]. While it is true, the landowners have worked together to *propose* prescriptions for the four other WAUs, Upper Green, Sunday, Smay and Howard Hanson, prescriptions for only two of these WAUs, Upper Green and Sunday, have been submitted to the WDNR for approval. Therefore, prescriptions have not been *achieved* for the bulk of the land above HHD, and the Corps as a land owner in some of these WAUs has not been active in the watershed analysis process to generate prescriptions to protect public resources, such as salmon, yet timber harvest is ongoing.

T03-24 See MIT response to T02-4 for a discussion of problems with the FFR/FEIS estimate of smolt production. Additionally, the FFR/FEIS response still deals with survival rates through the Project, rather than the number of juveniles that survive through the Project. Furthermore, while the MIT statement of 36% mortality of *chinook* was specific to passage through the Reservoir, the Corps has chosen to respond with a mortality rate for *salmonids* through the entire existing Project, including passage through both the reservoir and the Dam. See previous response regarding gravel stability.

T03-25 Much of the technical background of the Corps' Ecosystem Restoration Reconnaissance Report relied upon the document produced by King County. As mentioned in our response to the DFR/DEIS, the MITFD's comments upon the Ecosystem Reconnaissance Report, comments which were solicited by the Corps, upon the incorporated King County document in the Reconnaissance Report were not addressed by the Corps. The Corps has responded to our DFR/DEIS comment with a statement that "*during that process [Feasibility Study Report], written and oral comments from the MIT will be addressed and given careful consideration in further plan development*". It is unclear how a

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12 pers. comm. between Walt Pullian, Washington Department of Natural Resources and Roderick Malcom, MITFD.

document that will deal with the feasibility of constructing specific projects, will deal with the MITFD's concerns regarding the background information forming the basis for the selection of the projects.

T03-45/T3-46

The FFR/DEIS failed to respond to the MIT's concern that the project is inconsistent with MIT's requirements and goals to restore the quality and quantity of salmon habitat downstream of the dam so as to increase salmon production from downstream of the HHD. Furthermore, the FFR/FEIS response limits its goals, in regard to fish numbers, to a maintenance of fish numbers in the lower river. Nowhere does the FFR/FEIS mention a specific goal to increase the numbers of spawners in the lower river. Such a goal is not consistent with the Corps' trust responsibility to the Tribe.

T03-48 Assumed harvest rates are without meaning, unless sufficient numbers of fish are available for harvest. Given the concerns raised in this letter regarding potential problems with the estimate of smolt production, assumed estimates of harvest rates does not imply a specific number of fish to harvest.

T03-50 The FFR/FEIS has ignored the issue that the Tacoma Public Utilities (TPU) definition of riparian areas can imply that any land landward of a road or powerline right away could be presumed not to be riparian habitat, even if that land could contribute large woody debris to the stream. To avoid any misrepresentation of buffer widths, riparian mitigation projects should be stated, both, in absolute widths and the increase in width , if any, over the existing TPU Forest Land Management Plan. As previously stated, much of the riparian mitigation proposed for this project, appears to seek salmon habitat mitigation credit for actions that the *current TPU Forest Plan states are needed to maintain water quality and quantity.*

T03-51 The FFR/FEIS response deals with TPU lands that TPU has scheduled for timber harvest. The issues raised by the MIT was that an unquantified amount of land owned by Tacoma is committed by contract for timber harvest by others. Indeed, timber on TPU land within the riparian widths specified in the EIS was harvested by a private timber company as the EIS was being written. This issues arises from the fact that TPU might own the land, but the timber rights can be owned by another. The extent to which TPU does not own the timber rights could be a major issue. The Corps should seek written documentation from TPU stating the extent to which other entities can harvest timber from TPU lands.

T03-54 It is unclear to which statements the FFR/FEIS disagrees. However, the FFR/FEIS has restricted its response to the riparian areas and not discussed the potential impacts upon short to mid-term large woody debris recruitment into streams. Every tree that is removed from a riparian area will reduce the number of trees that can potentially fall into a stream to create salmon habitat. Leaving the fallen trees in the riparian zone will do nothing to address the loss of trees that could enter the stream channel. The Corps is referred to pages 55 and 56 (attached) of the NMFS *A Draft Proposal Concerning Oregon Forest*

Practices. Portland, Oregon for a discussion of the limitations of thinning and riparian restoration[13].

T03-61 The FFR/FEIS response does not recognize that the value of boulders to providing high flow refuge habitat declines with increasing flow, while that provided by LWD increased to a threshold flow. Boulders can not be construed to provide acceptable habitat for overwintering coho.

T03-66. Increment remains undefined and the FFR/FEIS has indicated that the goal is not to restore downstream spawning areas, despite the Project being a Corps Project (see Corps response T03-64) and that HHD has stopped the flow of gravel downstream. Additionally, the currently proposed monitoring plan for the gravel placement program will not include a component to determine if more gravel is required to maintain downstream existing habitat. Therefore, it is unlikely that the quality of downstream spawning habitat will improve, while it is very likely it will continue to decline due to objections that will be raised by downstream entities.

T03-69. The MIT comment was not directed to the Middle and Lower Green River as the FFR/FEIS has stated. The comment was addressed to the Green River above HHD, where the Corps has noted elevated temperatures. See response to T03-5

T03-85 The specific reasons for retracting the sections of a previous Corps' document stating that chum and chinook occurred in the project should be specified, rather than a simple statement of an incorrect citation from the another report. Furthermore, the Corps is directed to the Fisheries Module of the Watershed Analysis Resource Assessments completed for the Lester WAU. The Watershed Analysis for the Lester WAU states a sockeye run was presumed to have existed in the Green River in the project area[14]. Additionally, as the number of naturally spawning chum increases in the Green River, the upper extent of spawning moves upstream. The Corps should consider how the Project might be modified if naturally spawning chum reach the TPU Diversion Dam.

T03-87 It is unclear from the FFR/FEIS response if the cited harvest rates are for total harvest or what the Corps assumes will be the MIT's share of the harvest. This should be clear to avoid misunderstandings regarding the number of fish that this project is expected to provide for the MIT's treaty fishery.

T03-103 The question did not deal with the responsibility for passage to the upper watershed, but the implications for the purported benefits of the project, if the NMFS did not allow chinook to be transported above the HHD.

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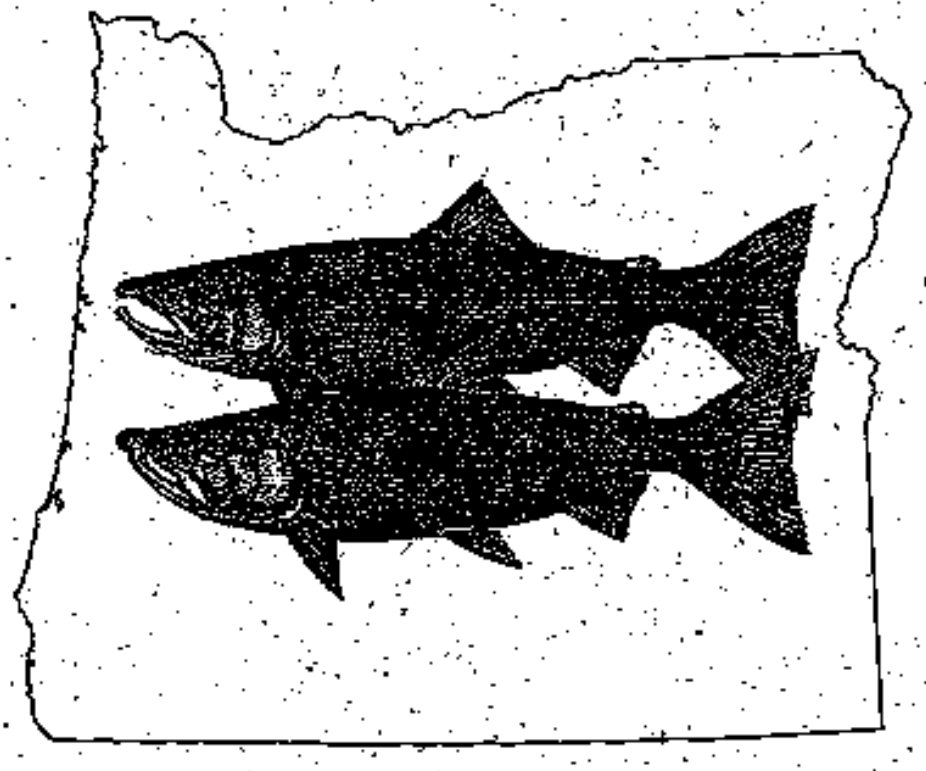
13 National Marine Fisheries Services. 1998. A Draft Proposal Concerning Oregon Forest Practices. Portland, Oregon.

14 Fox MF and E Cupp. 1996. Fish Habitat Assessment Module in Lester Watershed Analysis. Plum Creek Timber Company. Seattle. Washington

A DRAFT PROPOSAL CONCERNING OREGON FOREST PRACTICES



Submitted by the National Marine Fisheries Service to the Oregon Board of Forestry Memorandum of Agreement Advisory Committee and the Office of the Governor

Another example of a trigger would be to experimentally test a previously untested assumption within watershed analysis. As the results of a Benchmark Analysis provide a new (tested) assumption upon which to build an analytical procedure for watershed analysis, then the invalid procedure would be dropped and the valid procedure adopted. Periodic review, say annually, and adjustment of each component of watershed analysis will enable adaptive improvement of the process.

B. Technical Rationale for the Proposed Management Measures and Definitions

Riparian Management.

Vegetation in the aquatic protection zone greatly influences the biological and physical processes that provide freshwater habitat for coho salmon and other salmonids. These processes include shade and cover, water quality and flow routing, the aquatic food web, sediment routing and composition, stream channel bedform and stability, and linkages to the floodplain (Beschta 1991; Gregory et al. 1991; Schlosser 1991; Sullivan et al. 1987). Riparian vegetation produces habitat for coho salmon—depending on the position of the stream reach in the fluvial network (Vannote et al. 1980). Forestry practices have the potential to affect freshwater habitat for salmonids by changing the characteristics of, and inputs from, streamside vegetation (Gregory et al. 1987).

Shade is an important product of riparian vegetation—it moderates water temperatures. Reducing shade increases water temperatures, which can reduce the success or survival rate of coho salmon during adult upstream migration, downstream smolt migration, and juvenile rearing. Increased water temperatures can obstruct adult migration and limit spawning success; trigger early juvenile outmigration—resulting in decreased survival rates (Beschta et al. 1987); change juvenile sheltering behavior (Taylor 1988); reduce disease resistance; and increase metabolic requirements (Beschta et al. 1987). Riparian vegetation also provides the majority of the energy for the food web in heterotrophic systems by providing the allocthonous inputs that support aquatic macroinvertebrates (Cummins et al. 1983) and influencing the rate of nutrient spiraling (Newbold et al. 1982) under stable, persistent conditions (Gregory et al. 1987).

Large woody debris (LWD).

This is an important component of freshwater salmonid habitat. It is provided to stream systems by hillslope processes such as debris flows (McGarry 1994), but it largely comes from adjacent and upstream riparian vegetation. Woody debris regulates sediment and flow routing, influences stream channel bedform and stability, and provides hydraulic refugia and cover within stream systems (Bilby 1984; Gregory et al. 1987; Hogan 1987; Keller and Swanson 1979; Keller et al. 1995; Lisle 1983; Nakamura and Swanson 1993; Sedell and Beschta 1991). It thus influences the formation of the spatial template within which coho salmon exist (Sullivan et al. 1987;

Vannote et al. 1980). This template includes pool-riffle bedforms, backwater and edgewater habitats, and cover that provides adult spawning and holding habitat, juvenile summer and overwintering habitat, and refugia habitat from predation and high water velocities (Bisson et al. 1992; Sullivan et al. 1987). Reducing the quantity or quality of any of these habitats may reduce coho salmon survival (Bisson et al. 1992; Hicks et al. 1991; Rhodes et al. 1994). Woody debris also plays a key role in retaining salmon carcasses (Cederholm and Peterson 1985), a major source of nitrogen and carbon in stream ecosystems (Bilby et al. 1996). Forest management activities in the aquatic protection zone have the potential to change the distribution, size, and abundance of LWD in streams (Hicks et al. 1991; Ralph et al. 1994, McHenry et al. in-press) and to simplify stream channels (Bisson et al. 1992).

A riparian area's ability to provide these essential habitat requirements decreases in proportion to increasing distance from the streambank. Air temperature and relative humidity are not significantly altered if buffer strips in old-growth stands exceed 30 meters (100 feet) in width (Chen et al. 1995; Ledwith 1996). Both McDade et al. (1990) and Van Sickle and Gregory (1990), reported that more than 90% of the instream wood identified as coming from adjacent riparian sources came from within 200 feet from the channel, approximately one site-potential tree height for Douglas fir. Streambank stability is maintained within a distance of one-half to one site-potential tree height (Sedell and Beschta 1991). Nutrient input and retention, litter fall (Gregory et al. 1987), and shade functions (Beschta et al. 1987) also occur within 100 to 200 feet of the channel. At distances greater than approximately one site-potential tree height, the ability of riparian vegetation to provide these essential habitat requirements declines sharply. The NMFS believes that within this riparian area, forest management activities may change stream temperatures, increase sediment levels, alter the species composition and abundance of macroinvertebrates, destabilize streambanks, reduce in-stream structural complexity, and alter peak and base flows. Furthermore, the presence and use of roads within this area may contaminate water, create migration barriers, reduce stream shading, reduce large wood recruitment to the stream, and increase sediment levels. These impacts may harm coho salmon.

Timber harvest occurring upstream of coho salmon habitat may also adversely affect the species. Perennial reaches upstream of coho salmon habitat contribute to instream temperatures in the larger reaches downstream (Beschta et al. 1987). The loss of riparian vegetation above coho salmon habitat may increase instream temperatures downstream. Upstream reaches, including intermittent and ephemeral streams, carry sediment, nutrients, and woody debris down to salmonid habitat. The quality of coho salmon habitat is determined, in part, by the timing, speed, and amount of organic and inorganic materials transported downstream from reaches above salmonid habitat (Chamberlin et al. 1991). Management activities that increase sediment inputs upstream of coho salmon habitat may impair important habitat parameters such as deep pools and clean spawning gravels. Woody debris in upstream reaches regulate sediment and organic debris inputs downstream; the loss of LWD in these upstream reaches may increase sediment and debris transport into salmonid habitat. The loss of LWD in these upstream reaches also means there will be less LWD available to move downstream into coho salmon habitat (Bisson et al. 1987).

Studies examining riparian zone wood recruitment have purposely avoided stream reaches recently affected by landslides movement or acknowledged the inability to account for the origin of about half the wood found in small stream channels (VanSickle and Gregory 1990; McDade et al. 1990). Approximately 48% of the wood in mainstem Cummins Creek, a coastal Oregon wilderness stream, came from upstream sources, delivered primarily by debris torrents (McGarry 1994).

Timber management activities in riparian areas above coho salmon habitat that provide for adequate canopy cover, streambank stability, and allocthonous inputs (woody debris, litter, and nutrients) will likely avoid adverse impacts. Streambank stability is maintained by a dense, live root mass, through the contribution of root strength to bank stability declines at distance greater than one-half the crown diameter of a stream-side tree (FEMAT 1993). Activities in the upstream reaches of a watershed that significantly increase the amount of sediment delivered downstream may adversely affect coho salmon in those reaches (Frissell et al., 1997)

Road Management.

Roads can adversely affect coho salmon habitat by increasing sediment loads, altering channel morphology, destabilizing streambanks, modifying the hydrological drainage network, creating barriers to movement, and increasing the potential for chemical contamination (Furniss et al. 1991). Construction of a road network can greatly accelerate erosion rates in a watershed (Beschta 1978; Gardner 1979; Haupt 1959; Reid and Dunne 1984; Swanson and Dyrness 1975; Swanston and Swanson 1976). Cederholm et al. (1981) reported that the percentage of fine sediments in spawning gravels increased above natural levels when more than 2.5% of a basin area was covered by roads. Roads and other areas of surface disturbance continually erode fine sediments—providing a large source of sediment to streams (Swanston 1991). Roads and related ditch networks are often connected to streams, thus providing a direct conduit for the sediment. In steeper terrain, road construction may trigger mass soil movements that deliver large amounts of sediment directly into streams (Furniss et al. 1991). Improperly maintained roads may fail years after construction (Furniss et al, 1991). Roads built near watercourses can deliver sediment to streams, destabilize streambanks, and constrain the natural migration of the stream channel. Road networks can affect hillside drainages by intercepting, diverting, and concentrating surface and subsurface flow, and increasing a watershed drainage network (Hauge et al. 1979; Wemple et al. 1996). This can change peak and base flows and may trigger mass wasting events. Stream crossings can restrict channel geometry and prevent or interfere with adult and juvenile coho salmon migration (Furniss et al. 1991). Crossings can also be a source of sedimentation, especially if they fail or become plugged with debris (Furniss et al. 1991; Murphy 1995).

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conditions will likely be ineffective (Bisson et al. 1997). Active restoration that manages toward attaining a perceived minimum standard, with little regard for natural variability, is likely to be less useful in providing long-term productive habitats than an approach that works to restore ecological function.

Certain restoration activities such as bank stabilization, placement of instream structures, importing spawning gravel, etc., often involve altering critical coho salmon habitat parameters. Restoration activities may increase sediment levels, alter or divert stream flows, change channel geometry, reduce future LWD inputs, and block migration. If done properly, many of these impacts will be temporary in nature (e.g., increased sediment levels) and habitat condition will eventually improve. If improperly planned and executed, restoration activities can provide only temporary improvements ('band-aids') or, in the worst cases, actually degrade coho salmon habitat (National Research Council 1996). For example, a riparian tree harvest that would result in less shade or potential LWD recruitment may be a serious concern where current conditions are degraded with respect to water temperature and instream LWD. Placing stream weirs in a channel that is rich in sediment deposits may result in stream-bank scour and channel shifting. In order to conserve coho salmon, restoration activities that involve management within or adjacent to watercourses should not be proposed as part of a timber harvest unless an adequate watershed assessment has shown them to be necessary.

The existing protocol for placing LWD into streams (ODFW and ODF 1995) helps guide project managers in the use of appropriate methods of doing so, but the question of where to do such placement while ensuring future LWD recruitment remains. Currently the Oregon Forest Practice Rules require the basal area target to be reduced by up to 24% for LWD placement. This could greatly reduce LWD recruitment at a specific site, depending on how much the riparian stand is depleted to provide LWD pieces. Trees cut for instream placement should not come from the inner RMZ, and should be removed from the outer RMZ only if the stand is well stocked and the individual trees would likely not naturally fall in the stream. Without a watershed-scale analysis of current conditions and potential LWD recruitment—similar to the method for riparian wood assessment in the Washington Watershed Analysis Manual—it would be difficult to select appropriate sites for instream LWD placement. For example, pieces of woody debris may be placed in stream segments that are not responsive to wood inputs or that may require specifically large-sized pieces of LWD to function (Montgomery et al. 1996).

Another example of restoration is beaver management. This may involve maintaining or improving water and vegetation conditions to provide good beaver habitat or reducing conflicts between beavers, road drainages, and fish passage and perhaps even relocating animals to more favorable habitats (USDA 1986, Finnigan and Marshall 1997).

Matt Longenbaugh, NMFS 11/2/95
from Dan Ave

Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale

Non Federal Version
November 2, 1995

Prepared by
The National Marine Fisheries Service
Environmental and Technical Services Division
Habitat Conservation Branch

October 1995

DRAFT

Draft Draft Draft Draft Draft Draft Draft

TABLE 1. MATRIX of PATHWAYS AND INDICATORS

(Remember, the ranges of criteria presented here are not absolute, they may be adjusted for unique watersheds. See p. 3)

PATHWAY	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
Water Quality:	Temperature	50-57° F[1]	57-60° (spawning) 57-64° (migration &rearing)[1]	> 60° (spawning) > 64° (migration & rearing)[1]
	Sediment/Turbidity	< 12% fines (<0.85mm) in gravel[2], turbidity low	12-17% (west-side)[2], 12-20% (east-side)[2], turbidity moderate	>17% (west-side)[2], >20% (east side)[2] fines at surface or depth in spawning habitat[2], turbidity high
	Chemical Contamination/ Nutrients	low levels of chemical contamination from agricultural, industrial and other sources, no excess nutrients, no CWA 303d designated reaches[3]	moderate levels of chemical contamination from agricultural, industrial and other sources, some excess nutrients, one CWA 303d designated reach[3]	high levels of chemical contamination from agricultural, industrial and other sources, high levels of excess nutrients, more than one CWA 303d designated reach[3]
Habitat Access:	Physical Barriers	any man-made barriers present in watershed allow upstream and downstream fish passage at all flows	any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at baseflow flows	any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows
Habitat Elements:	Substrate	dominant substrate is gravel or cobble (interstitial spaces clear), or embeddedness<20%[3]	gravel and cobble is subdominant, or if dominant, embeddedness20-30%[3]	bedrock, sand, silt or small gravel dominant, or if gravel and cobble dominant, embeddedness>30%[3]
	Large Woody Debris	Coast: >60 pieces/mile >24"diameter>60 ft. length[4]; East-side: >20 pieces/ mile >12"diameter>35 ft. length[2]; and adequate sources of woody debris recruitment in riparian areas	currently meets standards for properly functioning, but lacks potential sources from riparian areas of woody debris recruitment to maintain that standard	does not meet standards for properly functioning and lacks potential large woody debris recruitment

	Pool Frequency channel width / # pools/mile[4] 5 feet 184 10 " 95 15 " 70 20 " 56 25 " 47 50 " 26 75 " 23 100 " 15	meets pool frequency standards (left) and large woody debris recruitment standards for properly functioning habitat (above)	meets pool frequency standards but large woody debris recruitment inadequate to maintain pools over time	does not meet pool frequency standards
	Pool Quality	pools >1 meter deep (holding pools) with good cover and cool water[5], minor reduction of pool volume by fine sediment	few deeper pools (>1 meter) - present or inadequate cover/temperature[5], moderate reduction of pool volume by fine sediment	no deep pools (>1 meter) and inadequate cover/temperature[5], major reduction of pool volume by fine sediment
	Off-channel Habitat	backwaters with cover, and low energy off-channel areas (ponds, oxbows, etc.)[6]	some backwaters and high energy side channels[6]	few or no backwaters, no off-channel ponds[6]
	Refugia (important remnant habitat for sensitive aquatic species)	habitat refugia exist and are adequately buffered (e.g., by intact riparian reserves); existing refugia are sufficient in size, number and connectivity to maintain viable populations or sub-populations[7]	habitat refugia exist but are not adequately buffered (e.g., by intact riparian reserves); existing refugia are insufficient in size, number and connectivity to maintain viable populations or sub-populations[7]	adequate habitat refugia do not exist[7]
Channel Condition & Dynamics:	Width/Depth Ratio	<10[3,4]	10-12 (we are unaware of any criteria to reference)	>12 (we are unaware of any criteria to reference)
	Streambank Condition	>90% stable; i.e., on average, less than 10% of banks are actively eroding[8]	80-90% stable	<80% stable
	Floodplain Connectivity	off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession	reduced linkage of wetland, floodplains and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function, riparian vegetation/succession	severe reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas; wetland extent drastically reduced and riparian vegetation/succession altered significantly

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

April 4, 2000

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
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LACEY, WA
RECEIVED

Reply To
Attn Of: ECO-088

Mr. Tim Romanski
U.S. Fish and Wildlife Service
510 Desmond Drive, S.E., Suite 102
Lacey, Washington 98503-1263

Mr. Mike Grady
National Marine Fisheries Service
510 Desmond Drive, S.E., Suite 103
Lacey, Washington 98503-1263

Ref: 98-045-FWS

Dear Mr.Romanski and Mr. Grady:

1 The U.S. Environmental Protection Agency has reviewed the Tacoma Water Habitat Conservation Plan (HCP) and Draft Environmental Impact Statement (DEIS). We are submitting comments on the HCP and DEIS pursuant to our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Thank you for accepting our comments.

Tacoma Public Utilities, Tacoma Water (hereafter referred to as Tacoma Water) has, in accordance with Section 10(a)(2)(A) of the Endangered Species Act (ESA), applied for an incidental take permit (ITP) for a period of 50 years to cover various activities relating to their diversion of water from the Green River, as well as the management of their lands in the upper Green River Watershed located in King County, Washington. Species to be covered by the ITP include chinook salmon, bull trout, northern spotted owl, marbled murrelet, and 28 other listed and unlisted species that may be affected by Tacoma Water's activities in the Green River Watershed.

Three water withdrawal alternatives are analyzed, and three alternatives are analyzed for Tacoma Water's land management in the upper Green River Watershed. The water withdrawal alternatives include the Alternative A, No Action; Alternative B, the Proposed Action to issue an ITP in conjunction with continued operation of the Green River Project at river mile (RM) 61 with

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associated facilities expansion and modifications to increase water withdrawals and accommodate species covered by the ITP; and Alternative C, construction and operation of a new diversion at RM 29.2. The upper watershed land management alternatives include Alternative A, No Action; Alternative B, the Proposed Action to continue timber harvest according to the terms of the HCP; and Alternative C, No Commercial Timber Harvest on Tacoma Water's lands in the Upper Green River Watershed.

We have described our concerns and information needs in the enclosed detailed comments. Some key points include:

2 • The need for excellent coordination and communication among the U.S. Army Corps of Engineers, Tacoma Water, the Services, the Muckleshoot Indian Tribe, and other resource agencies to resolve the details of flow management and fish passage, and for adaptively managing the Green River to support salmonids and other covered species;

3 • The need to integrate and coordinate the terms of the HCP with TMDLs for 303(d) listed waters of the Green River Basin, especially with respect to temperature exceedances; and

4 • The need to provide more information concerning gravel enrichment, water conservation, cumulative effects, and the Services' ability to conduct adequate follow-up and information sharing once the ITP is issued.

We have rated the DEIS as EC-2, Environmental concerns, Insufficient Information. An explanation of the rating is
5 enclosed with this letter. If you have questions or would like to discuss these comments further, please contact Elaine Somers of my staff at (206)553-2966. Thank you for the opportunity to comment.

Sincerely,

Richard B. Parkin

Richard B. Parkin, Manager
Geographic Implementation Unit

Enclosures

U.S. Environmental Protection Agency
Tacoma Water HCP and DEIS
Detailed Comments

We have the following comments and concerns regarding the Tacoma Water HCP and DEIS:

6 **Coordination and follow-up.** In order for the proposed action to be successful, there will need to be excellent coordination and communication among the U.S. Army Corps of Engineers (operators of the Howard Hansen Dam, an integral component of the water supply project), Tacoma Water, the Services, the Muckleshoot Indian Tribe, and other resource agencies. This coordination and communication will be essential in resolving the details of flow management and fish passage, and for adaptively managing the Green River to support salmonids. The HCP and EIS should provide some detail about how this coordination will be achieved. Will there be a Green River Flow Management Committee (GRFMC) as mentioned on page 6-12 of the HCP? If so, how often will they confer and who will convene the group? What other methods will be used to ensure close coordination and communication with interested and affected parties?

7 Tacoma Water indicates (HCP, p. 6-12) that there will be 5 year reviews of the monitoring results, and the reports will be shared with the Services. The Services are expected to distribute the reviews to other interested and affected entities. Because dissemination of monitoring results has been problematic with respect to some HCPs, would it be possible for Tacoma Water to distribute the monitoring reports directly to USACE, WDFW, WDOE, WDNR, MIT, King County, EPA, the GRFMC, and other interested parties?

8 The Implementing Agreement indicates that "The Services may conduct inspections and monitoring in connection with the permit in accordance with their regulations." This does not adequately inform regarding the intent or the ability of the Services to perform follow-up and oversight of the HCP. We ask that the Services be more explicit about their overall ability to be meaningfully engaged in the implementation of this HCP in light of the fact that there are many more existing and prospective incidental take permittees and their associated HCPs competing for the Services' attention.

Water Quality. We appreciate that Tacoma Water manages their lands and facilities to provide quality water for drinking water supplies. Nevertheless, there are water quality problems in the Green River Basin within the influence of this project (HCP, p.4-8). Ecology's 303(d) list includes: (1) the Green River between RM 11 and 42.3 listed for mercury, fecal coliform, and temperature; and (2) the Green River between RM 42.3 and 64.5 listed for temperature.

9

Temperature exceedances are first noted above the Howard Hansen Dam (HHD) reservoir and increase progressively downstream (HCP, p. 4-9). Inflows into the HHD reservoir exceed 16 degrees C during the summer in most years for brief periods. In the HHD reservoir, summer surface water temperatures have been found to be 9.4 degrees C above lower level reservoir temperatures, which would result in temperatures of 19.4 to 22.2 degrees C. Between HHD and the Tacoma Water Headworks, summer water temperatures average 13.9 to 18.3 degrees C.

10

The low flow water releases from HHD are taken from the lower, colder stratum of the reservoir. Consequently, early summer releases are usually below expected natural temperature. However, by late summer and early fall the cooler water is depleted and is replaced by releases of the warmer surface water that exceeds temperature standards. As noted in the HCP, "These artificially higher temperatures can adversely affect salmon spawning behavior and may accelerate maturation of developing salmon eggs."

11

While the operation of HHD is not covered by this HCP, its influence is integral to the success of this HCP and the findings of the Services with respect to ESA listed salmonids. Consequently, the results of the ESA Section 7 consultation with the U.S. Army Corps of Engineers (USACE) regarding HHD operations should be disclosed as part of this EIS. Have the Services determined that warm water releases during low flow periods will control temperatures downstream to the extent that takings of listed species have been minimized?

12

13

While this management regime may comply with ESA requirements, there is no assurance or evidence that Clean Water Act (CWA) requirements will be met. EPA believes that HCPs prepared in response to ESA species survival and recovery needs

14

14 should be consistent with present and future Total Maximum Daily
Loads (TMDLs) prepared to satisfy CWA requirements. The FEIS
15 should identify the TMDL status for the 303(d) listed water
bodies. The HCP has several watershed restoration elements that
16 may be incorporated into a TMDL at a later date if they prove to
be effective, and it is important to anticipate that it will be
necessary to integrate and coordinate the HCP with the TMDL.

We recommend that a caveat be included in the HCP that a TMDL will need to be completed at a future date by the State to cover all land ownerships affecting the 303(d) listed waters. Tacoma Water may expect assurance that they are in compliance with Federal requirements via the acceptance of their HCP and
17 issuance of an ITP by the Services. However, unless a TMDL is developed and integrated with the HCP, they won't have that assurance. We would recommend that a "re-opening" statement be included and/or an adaptive management process be established to allow for HCP measures to be reassessed when the TMDL is completed. We urge that Tacoma Water, the Services, the USACE and other entities coordinate the HCP closely with EPA and Ecology in meeting Clean Water Act mandates.

Gravel enrichment mitigation. One of the mitigation measures to benefit fish habitat for Water Withdrawal Alternative B would be the addition of up to 3,900 cubic yards of gravel (the
18 estimated minimum average annual bedload contribution) to the mainstem Green River downstream of the Tacoma Headworks (DEIS p. 4-5). This would restore a portion of the gravel that is blocked
19 by the HHD. Would this augmentation occur on an annual basis, unless monitoring results indicate it should be discontinued?

20 We have concerns about the use of gravel mined from a nearby
pit. First, where will the source of the gravel be, and what are
21 the direct and indirect impacts from ongoing gravel extraction to
supply this project? If gravel accumulating behind the HHD
(which has been weathered and rounded, thereby providing a
22 suitable substrate for spawning) requires periodic removal, would
it be possible to use it for gravel replenishment instead? Could
it be removed when the reservoir is kept low for flood control,
washed, and transferred downstream?

23 Second, we believe more analysis is needed regarding the
24 proposed mitigation. What methods were used to determine that

3900 cubic yards of gravel is the average minimum annual bedload? With newly mined coarse sand and gravel, the pore space that
24 enables water and oxygen circulation, and the rounded form that facilitates nest excavation by spawning female fish would likely not exist until the gravel had weathered sufficiently. The citation for Kuennen, 1956, which was referenced in the DEIS text (p. 4-5) regarding this issue, was not included in the DEIS reference list. Consequently, there is no basis for evaluating the relevance of Kuennen's work to this situation. Has there been adequate modeling/analysis to determine whether or not the
25 gravel will be available for spawning, such as evaluating the rock size and type (lithology), and the distance and force for movement (hydraulics). Since dams, particularly those operated for flood control, tend to smooth the storm hydrograph, will water releases be designed to emulate storm events in order to mobilize the gravel? With respect to controlled flows and gravel/sediment movement and aggradation, how is the equilibrium of the river environment expected to shift?

Third, how will Tacoma Water monitor the effectiveness of
26 this mitigation, and how might the action be modified in response to the results? In sum, we recommend that the project proponent conduct a more extensive literature search on this subject, perform needed modeling/analysis, and document their work in
27 order to implement more informed and cost effective mitigation and to increase the likelihood of success.

Cumulative effects and related actions. We appreciate the
28 effort to describe, on a broad level, the effects of the land management and regulatory programs affecting the ITP covered/ESA listed species. We did not find, however, a discussion of actions not covered by the HCP/ITP, but that are directly related to the Green River Second Supply Project and Additional Water
29 Storage Project. At a minimum, these include the raising of Howard Hansen Dam for additional water storage, and the construction of the new 33.5 mile water pipeline for the Second
30 Supply Project. We expect that these projects will be dealt with via direct consultation with the Services under ESA. However, their anticipated impacts as well as their cumulative effects with respect to ITP covered species should be discussed in the
31 EIS. What mitigation is anticipated for the additional impacts to species and their habitats?

32 **Water conservation.** It is indicated in the EIS that water conservation measures are included as part of any of the proposed alternatives. We commend Tacoma Water for their proactive efforts in this area, and we recommend that more detail regarding the water conservation program be provided in the EIS. Measures being implemented as well as potential measures for water conservation that are currently not being implemented or that could improve with additional effort should be listed and briefly
33 described. This would shed light on the extent to which water conservation can be used in the future to abate increased demand, and on the overall sustainability of the proposed action in terms of future growth and water usage vs. the needs of covered species.

34 With respect to financial incentives, for example, to what extent is rate structure for residential and commercial customers used to encourage water conservation? Are businesses, particularly those that use very large quantities of water,
35 charged at least as much or more than residential users per unit of water, or are they given a price break due to their large
36 quantity usage? How strong are the financial incentives for both residential and commercial/industrial users?

37 **Upper watershed alternatives.** We are encouraged Tacoma Water has proposed stronger riparian protections than other comparable HCPs and land management programs, except for FEMAT (DEIS, p. 4-207). However, effectiveness monitoring is needed for measures in the upper watershed, in particular the riparian
38 measures. This is a good opportunity to document level of effectiveness for the prescribed protection, since scientific uncertainty continues to exist in this area.

39 While timber receipts enable Tacoma Water to purchase more land in the upper watershed, we encourage them to move, as much as possible over time, toward Alternative C, no timber harvest in the upper watershed. This would virtually eliminate the need for road construction and maintenance and habitat damage control, and would provide optimal drinking water source protection and habitat protection for the 32 covered species.

U.S. Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Definitions and Follow-Up Action*

Environmental Impact of the Action

LO - - Lack of Objections

The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - - Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO - - Environmental Objections

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU - - Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 - - Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - - Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonaby available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 - - Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

U.S. FISH & WILDLIFE SERVICE
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DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-2255

REPLY TO
ATTENTION OF
Planning Branch

Tim Romanski
U.S. Fish and Wildlife Service
510 Desmond Drive, S.E., Suite 102
Lacey, Washington 98503-1273

Dear Mr. Romanski:

1 We have reviewed the Draft Habitat Conservation Plan, Environmental Impact Statement and Implementation Agreement for the Green River Water Supply Operations and Watershed Protection with respect to the U.S. Army Corps of Engineers' areas of special expertise and jurisdiction by law as determined by the President's Council on Environmental Quality on December 21, 1984.

2 Generally, we are well satisfied with these documents. We have had input to their preparation and look forward to continuing participation in your planning process. The following comments are for your consideration in improving the reports. This letter supercedes all previous correspondence regarding the DEIS review, including e-mails to Tacoma Public Utilities.

3 • There seems to be a misunderstanding regarding the original authorization for Howard Hanson Dam. The original authorized project purposes were: 1) Flood Control 2) Flow Augmentation 3) Irrigation 4) Municipal and Industrial (M&I) Water – there was NO specific amount of storage for M&I water (i.e., 20,000 acre feet (af)) in the original authorization.

4 • The additional 5,000 af of storage for low flow augmentation was authorized in the Section 1135 project – under that authorization it can be adaptively managed and stored any year. That storage is NOT dependent on the Additional Water Storage Project (AWSP).

5 • The 1135 project stores water between elevations 1141–1147 feet. Phase I of the AWSP stores 20,000 af between 1147 and 1167, not 1141 and 1167.

6 • Lower Bear Creek may be replaced as a mitigation site with one that will provide more benefits. At this point no adult fish will be introduced into the river between the dams, therefore spawning in Bear Creek will be limited at best. Another site may provide more mitigation benefits.

7 • Page 4-11. Lines 22-23 "no net accretion." Please clarify. Seems there HAS been accretion and that is why turbidity pool elevation is about 1070 feet, rather than 1035.

8 • Page 5-30. Lines 21-22. This discussion of blending has become somewhat overcome by events/design changes. Please update.

9 • Page 6-4. Lines 31-40. Please clarify this discussion.

10 • Page 7-8. Lines 6-9. Consider changing language to say flows are 113–213 cfs less. The "something less that 113 cfs" may be confusing to some. Note figures 7-1, 7-2 and 7-3 on the following page all show the minimum withdrawal to be 113 cfs, not "something less than 113 cfs."

11 • Page 7-49. Lines 12-13 indicates "up to 50% of the wood…". This varies with lines 20-22 on Page 5-61 which states "at least half" of LWD…. Please clarify for accuracy and consistency.

12 • Page 7-49. Lines 16-17. Re "several miles". It would be more accurate to state that water temperature benefits would be realized for about the first three miles.

13 • Page 7-49, Lines 25-27. Please clarify that the radial gates are not used through most of the summer and fall (minimum radial gate opening is about one foot). When flows need to be reduced further, our current operation is to switch over to the 48 inch bypass.

Thank you for the opportunity to review this plan.

Sincerely,

Mark T. Ziminske, Chief
Environmental Resources Section

USDA United States Department of Agriculture

Forest Service

Mt. Baker-Snoqualmie National Forest
North Bend Ranger District
42404 S.E. North Bend Way
North Bend, WA 98045

U.S. FISH & WILDLIFE SER
WESTERN WA OFFIC
APR 10 2000
LACEY, WA
RECEIVED

File Code:2500

Date: April 6, 2000

Tim Romanski
Project Biologist
U.S. Fish and Wildlife Service
510 Desmond Dr. SE
Suite 102
Lacey, WA 90503-1273

Dear Mr. Romanski,

1 Thank you for the opportunity to comment on the draft Habitat Conservation Plan. Given the recent listing of bull trout and Chinook salmon as threatened species, I would like to clarify several statements in the document.

2 In Section 4.1.3.1 stream temperatures are discussed. The Forest Service has conducted stream temperature monitoring using thermographs and stream temperatures were also found to generally remain below 60 degrees Fahrenheit in the upper Green River and its major tributaries. The one area of concern is in Sunday Creek, where temperatures were found to increase as much as 5 degrees Fahrenheit as a result of the lack of riparian vegetation under the BPA powerlines. One thermograph was placed just above this BPA managed section and then a second placed at the lower end of the powerline influence, approximately 2.5 miles downstream. The data is currently being analyzed and will be available by late summer.

3 On page A-7, line 25, the document states, "The USFS conducted surveys in the upper GreenRiver drainage and Sunday Creek basin over a series of years and found no evidence of native char..." The surveys in the Upper Green River were not specifically designed for bull trout and did not follow an accepted sampling protocol for bull trout.

4 The Sacramento River in Monterey County, California is cited on page A-17, line 23 as being the southern-most range of Chum salmon. To the best of my knowledge, there is not a Sacramento River in Monterey County and a search on the USGS website did not find a match.

5 The document lists many restoration projects proposed by Tacoma Public Utilities. The Forest Service has conducted in-stream restoration, riparian planting, fish passage, and road obliteration projects in the past. We are very interested in cooperatively working with Tacoma to complete additional projects.

If you have any further questions, please contact me at (425) 888-1421.

KAREN BERGERON
Hydrologist

4.4 FEDERAL AGENCY COMMENT LETTERS

Comment Responses to Environmental Protection Agency (FED 1)

FED 1-1 through FED 1-5

The Services recognize and acknowledge the EPA's internal NEPA rating system for DEISs; however, the Services have not adopted this system. We assume that the remaining comments contained in the EPA letter identify all areas where information in the DEIS is believed to be insufficient for the EPA to fully assess impacts. The Services have responded to all specific EPA comments, and have provided additional information in the FEIS where appropriate.

FED 1-6

See General Comment Response 16.

FED 1-7

The Services will discuss with Tacoma Water the possibility of having Tacoma Water distribute regularly scheduled monitoring reports to interested parties, including the EPA. If Tacoma Water is unwilling or unable to distribute these monitoring reports, the Services are capable and willing to distribute monitoring reports to the EPA and other parties who have expressed interest in reviewing them.

FED 1-8

Tacoma Water's HCP addresses and includes the City's commitments for monitoring its activities (compliance monitoring) and the impacts that may result from those activities, as well as the effectiveness of conservation measures (effectiveness and research monitoring). The HCP does not address additional compliance monitoring that may be conducted by the Services. Applicants create HCPs, and once accepted by the Services, the HCPs guide the actions of the permittee. As such, HCPs do not specify the monitoring actions the Services will conduct. The IA establishes the authority of the Services to conduct compliance inspections as outlined in 50 CFR 13.47.

The Western Washington Office of the USFWS has established a Branch of Monitoring and Evaluation with primary responsibility for monitoring the compliance of HCP permittees. The Services will prioritize the attention it gives to various HCPs during monitoring by: 1) the level of risk associated with the activities, 2) the extent of the activities, 3) the degree to which monitoring results can be factored into adaptive management, and 4) the vulnerability of the affected resources.

FED 1-9

See Specific Comment Response FED 1-11.

FED 1-10

See Specific Comment Response FED 1-11.

FED 1-11

The proposed downstream fish passage facility (HCM 2-01) would enhance temperature regulation in the Green River. A description of the use of the downstream fish passage facility to regulate temperature is found in USACE 1998, and HCP subsection 7.1.4, Potential Effects of the HCP on Chinook Juvenile Rearing.

FED 1-12

The Services recognize that the operation of Howard Hanson Dam is integral to the implementation of the HCP. The USACE is currently consulting with the Services with respect to both its ongoing operation and maintenance of the Howard Hanson Dam facilities, as well as the proposed Additional Water Storage Project. These consultations were not complete at the time the FEIS was prepared; therefore, it was not possible to include the findings in the FEIS.

FED 1-13

See Specific Comment Response FED 1-11.

FED 1-14

See Specific Comment Response FED 1-17.

FED 1-15

A Total Maximum Daily Load (TMDL) study has not been conducted for 303(d) listed reaches of the mainstem Green River.

FED 1-16

See Specific Comment Response FED 1-17.

FED 1-17

Tacoma Water is aware that the ITP only covers the incidental take of the listed and unlisted species (should they become listed in the future) that Tacoma Water has addressed in its HCP. The ITP that Tacoma Water would receive from the Services does not exempt Tacoma Water from complying with the Clean Water Act or other applicable federal, state, or local laws, nor does Tacoma Water expect Clean Water Act assurances from the EPA or Ecology as a result of this process. Therefore, the Services believe it would be unnecessary to include a caveat in the HCP requiring Tacoma Water to complete TMDLs for 303(d) listed waters on its ownership, since the Services are not authorized under the Clean Water Act to grant such assurances. If, at a later date, the EPA and Ecology want to discuss Clean Water Act assurances the Services and Tacoma Water would be interested. Nothing in the HCP, ITP, or IA would prevent such a dialogue, or exclude Tacoma Water from taking additional measures to comply with the Clean Water Act.

FED 1-18

Comment noted.

FED 1-19

As documented in the HCP subsection 5.2.9, Habitat Conservation Measure HCM 2-09, Mainstem Gravel Nourishment, "Tacoma Water and the USACE will provide *annual* funding sufficient to place up to 3,900 cubic yards of gravel suitable for use by spawning salmonids within the mainstem Green River between RM 64.5 and RM 32.8" (emphasis added).

FED 1-20

Comment noted.

FED 1-21

Tacoma Water and the USACE expect to purchase gravel from a local vendor. Five commercial gravel pits utilizing deposits of Quaternary outwash gravels are located in general proximity to the Green River (U.S. Army Corps of Engineers 2000). Identifying and mitigating the environmental effects of supplying a source of gravel would be the responsibility of the vendor.

FED 1-22

The USACE does not anticipate removing gravel-sized sediments from behind Howard Hanson Dam on a periodic basis. If a large quantity of gravel is removed from behind Howard Hanson Dam, it would be considered as a source for downstream gravel nourishment.

FED 1-23

The estimate of average minimum annual bedload was based on analyses described in Appendix F1, subsection 4B, Gravel Nourishment in the Middle and Upper Green River of the DEIS for the Howard Hanson Dam, Additional Water Storage Project (U.S. Army Corps of Engineers 1998). Separate analyses conducted by a USACE contractor for the Green/Duwamish Ecosystem Restoration Project described similar conclusions (Perkins 2000).

FED 1-24

Comment noted.

FED 1-25

Full citations of documents cited in the DEIS, including Kuennen 1956, were presented in DEIS, Section 7.0, References. Analyses of bedload movement in the Green River below Howard Hanson Dam suggest that the critical flow required to mobilize gravel-sized sediments is well below the 12,000 cfs maximum design release flow at Howard Hanson Dam (DEIS, Appendix F1, subsection 4B, Howard Hanson Dam, Additional Water Storage Project, USACE 1998).

FED 1-26

The effects of the gravel nourishment conservation measure (HCM 2-09) would be monitored as described in the HCP, subsection 6.1.9, Research Funding Measure RFM-03B, Monitor Distribution of Sediments below Tacoma Headworks. The conservation measure allows for changes in the volume, location, and method of placement as determined by the Services in coordination with

Tacoma Water, Muckleshoot Indian Tribe, USACE and other federal, state, and local agencies with jurisdiction.

FED 1-27

The gravel nourishment conservation measure described in Tacoma Water's HCP (HCM 2-09) was based on the results of mathematical modeling and analyses conducted by the USACE and contractors for the Howard Hanson Dam Additional Water Storage Project. Separate analyses conducted by the USACE and contractors for the Green/Duwamish River Ecosystem Restoration Study reached similar conclusions regarding the need and likelihood of success of gravel nourishment in the Green River.

FED 1-28

Comment noted.

FED 1-29 through 1-31

Refer to General Comment Responses 12, 13, 14, 15, 29, and 30. Regarding Specific Comment FED 1-29, it should be noted that Howard Hanson Dam will not be raised as part of the Additional Water Storage Project; rather, additional water storage capacity will be developed for municipal water supply storage behind the existing dam.

FED 1-32

Comment noted.

FED 1-33

See General Comment Response 4.

FED 1-34

Tacoma's rate structure is currently designed to encourage conservation. Depending on the volume of use, customer classes see either a flat rate or an inclining block structure. A summer use surcharge increases the cost of water use during the summer when stream flows are most sensitive.

FED 1-35

Tacoma Water has indicated that larger businesses generally pay a lower rate per unit of water than residential users. This is not based on a price break for their large volume of consumption, but instead reflects a lower cost per unit to serve these customers as a result of their steady rate of use throughout the year and the reliance on a limited portion of Tacoma's water supply facilities to provide them service. Tacoma's cost-of-service rate structure follows rate-setting practices generally accepted for public water utilities.

FED 1-36

Tacoma Water currently provides financial incentives for both residential and commercial/industrial users in the form of flat or inclining block rates and a summer surcharge on residential rates. In addition, Tacoma conducts audits of industrial customers to determine opportunities for industrial conservation. Tacoma Water considers conservation by major customers an alternative to new source development and will consider participation in such conservation efforts where cost effective.

FED 1-37

Comment noted.

FED 1-38

The riparian management strategy of the HCP follows the recommendations of the recently developed Washington Forests and Fish Report, although the HCP is more protective of riparian habitat in many situations. The effectiveness of the Forests and Fish Report will be evaluated through region-wide monitoring, coordinated by the Comprehensive Monitoring, Evaluation, and Research committee of the Timber, Fish and Wildlife program. The Services anticipate that the extensive monitoring and adaptive management to be implemented under the Forests and Fish Report will provide sufficient information to evaluate the effectiveness of the Forests and Fish Report in general, and the HCP in particular. Should the monitoring indicate that the Forests and Fish Report and the HCP are insufficient to satisfy the Clean Water Act, Tacoma Water, like other landowners in the state, could be obligated to increase the level of riparian protection to meet TMDLs.

FED 1-39

See General Comment Responses 7 and 10.

Comment Responses to U.S. Army Corps of Engineers (FED 2)

FED 2-1

Comment noted.

FED 2-2

Comment noted.

FED 2-3

Comment noted. We assume the commenter is referring to the statement in HCP subsection 2.3.3.1, Current Operation of Howard Hanson Dam. We believe reference to municipal water supply as an originally authorized but unquantified project purpose is correctly described in other sections of Tacoma Water's HCP. The authorizing document for the Howard Hanson Dam Project provided by the 81st Congress in H.D. 71, and dated 28 February 1949 states that: "In view of the uncertainties of future water supply and irrigation requirements, benefits therefrom have not been considered in the project economics, but provision for their ultimate need has been made."

The statement in the HCP referring to the existing project authorization of 20,000 acre-feet of storage for municipal use was taken from the Draft Feasibility Report and Environmental Impact Statement, subsection 1.7.3 (U.S. Army Corps of Engineers 1998). The statement in the USACE document is incorrect and, thus, use of that information is likewise incorrect. The error was noted and corrected in other sections of the HCP.

FED 2-4

Comment noted. We agree that under the authorization of the Section 1135 Project, up to 5,000 acre-feet of water can be stored for low flow augmentation on a year-by-year basis in consultation with the Muckleshoot Indian Tribe, federal and state resource agencies, and Tacoma Water.

FED 2-5

Comment noted. Storage of up to 5,000 acre-feet of water for low flow augmentation under Section 1135 on an annual basis was assumed under model runs for both the Additional Water Storage

Project and Tacoma Water's HCP (see HCP subsection 7.0, Impact Analysis Procedures). Modeling assumptions for Howard Hanson Reservoir operations for the Additional Water Storage Project were accepted for hydrologic analyses under Tacoma Water's HCP to ensure consistency between the two projects.

FED 2-6

Comment noted. As noted in HCP HCM 2-03, Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Measures, "Alternate measures will be implemented if any of the above measures are determined to be infeasible or not cost-effective during the final design, or if environmentally superior measures can be implemented at comparable cost. Any alternate measures will have habitat benefits greater than or equal to the measure originally proposed, and will be reviewed and approved in advance by the NMFS and USFWS."

FED 2-7

The referenced statement in the HCP refers to no net accretion of suspended sediments, and adds "it is likely that large, heavy particles settle in the reservoir while small particles are carried downstream of the dam." The commenter correctly notes that there has been a net accretion of sediment consisting of bedload and a portion of the suspended sediment load entering the reservoir. A 1993 analysis of reservoir sedimentation indicates that between 1979 and 1993, the capacity of the Howard Hanson Reservoir has decreased at a rate of 44.4 acre-feet per year (U.S. Army Corps of Engineers 1993).

FED 2-8

The referenced statement in the supporting rationale for HCP HCM 2-01 will be modified to note that the intake of the proposed downstream fish passage facility will be capable of operating at a range of depths. This flexibility in depth of submergence will allow for improved temperature control during the summer.

FED 2-9

See HCP subsection 3.2.2, Unforeseen Circumstances and No Surprises.

FED 2-10

While the language proposed by the commenter would be easier to understand, it would not be correct. During most years, Tacoma Water is expected to withdraw between 113 and 213 cfs on a

daily basis. However, during severe droughts Tacoma Water would be constrained from withdrawing the full 113 cfs available under its First Diversion Water Right claim. As noted in HCP HCM 1-01, Tacoma will be required to constrain its water withdrawals to ensure flow in the Green River at Auburn does not fall below 225 cfs. Thus, water withdrawals would range from "something less than 113 cfs" to the full available water right of 213 cfs.

The referenced figures in the HCP describe modeled daily flows under water years 1994 (average year), 1992 (dry year), and 1990 (wet year). As modeled, Tacoma Water would withdraw the full 113 cfs available under its First Diversion Water Right every day during those 3 years.

FED 2-11

The commenter is correct regarding the statement on HCP Page 7-49: "up to 50 percent of the wood" conflicts with the "at least half" commitment in the Woody Debris Management Program described on HCP Page 5-61. Tacoma Water's commitment was increased during discussions with the Services, other resource agencies, and the Muckleshoot Indian Tribe and is correctly described in HCM 2-08 on HCP page 5-61. The commitment under HCM 2-08 was changed from an earlier version of the HCP, and it appears that all subsequent references in other sections of the HCP were not modified.

FED 2-12

The actual downstream extent of the benefits of water temperature control will not be confirmed until after the Additional Water Storage Project is in operation. At this time, we believe that the description "several miles" is as appropriate as the suggested description of "about the first 3 miles." The intent of the description was to indicate that the downstream extent of the benefits of water temperature control will only be realized for a short reach below Howard Hanson Dam instead of the entire 64 miles of river below the dam.

FED 2-13

It is our understanding that the referenced statement on Page 7-49 is correct.

Comment Responses to U.S. Forest Service (FED 3)

FED 3-1
Comment noted.

FED 3-2
Comment noted. We look forward to receiving the data when they are available.

FED 3-3
Comment noted. The referenced HCP text describes a list of fish surveys previously conducted in the Upper Green River Watershed. To date, no survey has documented the presence of native char in the upper watershed. Because the surveys were not conducted according to USFWS protocol, we cannot quantify the risk of native char remaining undetected by the surveys. Tacoma Water has developed conservation measures assuming that native char either exist in the upper watershed or would be introduced in the upper watershed as part of its upstream fish passage program. Documenting the presence or absence of native char in the upper watershed is not expected to affect implementation of the conservation measures.

FED 3-4
The statement in the HCP should indicate that "In North America, chum range from Monterey, California to Arctic coast streams (Salo 1991)."

FED 3-5
We anticipate future improved communication and cooperation with landowners in the Upper Green River Watershed. As part of the 1995 Settlement Agreement between the Muckleshoot Indian Tribe and Tacoma Public Utilities, the parties have agreed to initiate an annual meeting of all landowners in the upper watershed of the Green River to exchange information. The annual meetings are intended to encourage cooperation of all upper watershed landowners in implementing watershed actions and participation in projects designed to protect and enhance water quality and fish and wildlife habitat. These annual reviews will begin after Tacoma Water receives construction financing for the Second Supply Project, and are expected to lead to a more intensive review of Tacoma Water's upper watershed management program every 5 years as described in HCP Chapter 6, Monitoring and Research Program. The USFS is encouraged to participate and contribute to those annual and 5-year reviews.

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE. #102
Lacey, WA 98503

3/6/00

Dear Mr. Romanski:

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS)

1 Please require the utmost effort by Tacoma to save wild chinook salmon runs on the Green River. I want you to ensure that Tacoma's HCP guarantees the restoration of these and other salmon and steelhead runs and other species as well.

2 The HCP should end logging on Tacoma's lands to help heal the watershed. Forests help fish by keeping fine sediments out of the rivers. Trees help provide slow, steady return flows to the river and streams after rain and snow. They shade the streams to keep the water cold, they provide habitat
3 for all potential threatened species. Tacoma should be required to buy additional lands to help restore the watershed.

4 The HCP should keep flows in the river as natural as possible, including natural high flows which are important to fish. A lot of water must be in the
5 river to lessen the effects of pollution & help keep the water cool for salmon.

6 The HCP must not allow additional water storage at the Corps of Engineers dam. The juvenile salmon cannot find their way through the reservoir and need less water storage, not more. The two dams impact salmon by not
7 permitting upstream passage at all. Tacoma should be required to build fish ladders around them. Fish should not be trucked around them.

8 The HCP must require full restoration of the natural movement of gravel and sediment downstream which is now impaired by the dams. Spawning habitat
9 below and above the dams must be restored. Tacoma must also restore the large woody débris that occured naturally in the watershed.

10 The HCP must require that Conservation and Re-Use of water is the method for restoring the river.

11 The HCP must mitigate Recreational losses from Tacoma's use of the River.

Carol Beers
3242 NW 61
Seattle, WA 98107

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
MAR 13 2000
LACEY, WA
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IND - 2

Anita Rocha
8509 Fauntlee Crest SW
Seattle, WA 98136-1534

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE. #102
Lacey, WA 98503

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
MAR 29 2000
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Sincerely, Anita L. Rocha

WKC

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE

IND - 3

MAR 29 2000

LACEY, WA
RECEIVED

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11 The HCP must mitigate Recreational losses from Tacoma's use of the River.

Please pay attention to this issue

Wendy Sorsdens

Mr. Paul Russell
4207 Greenwood Ave. N
Seattle, WA 98103-7019

IND - 4

US Fish and Wildlife Service
510 Desmond Dr. SE. #102
Lacey, WA 98503

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE

MAR 29 2000

LACEY, WA
RECEIVED

3/24/00

2969 78th Ave SE
Mercer Island, WA 98040

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Walter J. Irwin
Lois Irwin

Members of Washington Kayak Club

IND - 5

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
MAR 29 2000
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10224 21st SW
Sea — 98146

Sharon Rundell
WKC member

IND - 6

US Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE

MAR 29 2000

LACEY, WA

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3 for all potential threatened species. Tacoma should be required to buy additional lands to help restore the watershed.

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5 river to lessen the effects of pollution & help keep the water cool for salmon.

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7 permitting upstream passage at all. Tacoma should be required to build fish ladders around them. Fish should not be trucked around them.

8 The HCP must require full restoration of the natural movement of gravel and sediment downstream which is now impaired by the dams. Spawning habitat
9 below and above the dams must be restored. Tacoma must also restore the large woody debris that occured naturally in the watershed.

10 The HCP must require that Conservation and Re-Use of water is the method for restoring the river.

11 The HCP must mitigate Recreational losses from Tacoma's use of the River.

Bill Wepp
6120 - 24th AVE NE
SEATTLE, WA 98115

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE. #102
Lacey, WA 98503

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
MAR 10 2000
LACEY, WA
RECEIVED

Dear Mr. Romanski:

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS)

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11 The HCP must mitigate Recreational losses from Tacoma's use of the River.

Jacoba Johnson

JACOBA JOHNSON
3960 Dayton Ave N.
Seattle, WA 98103

IND - 8

US Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

Dear Mr. Romanski:

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS)

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S Robinson

Steve Robinson
5734 E Green Lake Way N
Seattle, WA 98103-5654

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE. #102
Lacey, WA 98503

IND - 9

U.S. FISH & WILDLIFE SERVIC
WESTERN WA OFFICE

MAR 29 2000

LACEY, WA
RECEIVED

Dear Mr. Romanski:

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS)

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UWCC MEMBER
800 401 3451

IND - 10

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE

MAR 27 2000

LACEY, WA
RECEIVED

Dear Mr. Romanski:

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS)

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Marie Mills (WKC member)
7048 Earl Ave NW
Seattle WA 98117

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE. *102
Lacey, WA 98503

IND - 11

APR 3 2000

Dear Mr. Romanski:

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS)

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Sincerely yours,

Donald G. Battles (Donald G. Battles)

326 South 10th Street
Mount Vernon, WA.
98274 (360) 336-5443

IND - 12

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

4018 59 Ave SW
Seattle, WA 98116

APR 3 2000

Dear Mr. Romanski:

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS)

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11 The HCP must mitigate Recreational losses from Tacoma's use of the River.

James Montgomery
JAMES G. MONTGOMERY
WASHINGTON KAYAK CLUB

Carolyn Leaver
Carolyn Leaver
Washington Kayak Club

IND - 13

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

APR 3 2000

Dear Mr. Romanski:

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS)

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10 The HCP must require that Conservation and Re-Use of water is the method for restoring the river.

11 The HCP must mitigate Recreational losses from Tacoma's use of the River.

Dear Sir - My wife and I have studied this statement carefully and concur with it. While we live in Seattle we feel taking more water from the Green River is a regional problem affecting all of us.

Thank you Edward Boulton

Date: 03/16/2000 9:38 AM
Sender: "Don Johnston & Cynthia Weeks" <paralax@wolfenet.com>
To: <tim_romanski@fws.gov>
bcc: Tim Romanski
Priority: Normal
Subject: Habitat Conservation Plan for Green River

March 15, 2000

US Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98501

Dear Mr. Romanski:

1 We are writing to protest the proposed plan that would give the Tacoma water utility a 50-year Incidental Take Permit under the ESA.

2 Instead, we want to see an end to commercial logging on Tacoma?s lands in the watershed (as Seattle has done!). Additionally, Tacoma must provide adequate instream flows for salmon

3 and recreation in the lower river. More water conservation is needed, not more water diverted from the river. If a fish ladder will not work to get salmon

4 over the 235-foot barrier of the dam, then substantial habitat preservation and restoration downstream must be done to offset that loss of spawning habitat.

Thank you for your time and consideration.

Sincerely,

Cynthia Weeks & Don Johnston
1758 Dexter Avenue N, #8
Seattle, WA 98109

Date: 03/31/2000 1:57 PM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:City of Tacoma Habitat Conservation Plan

Author: Tim Romanski at 1PO-OLES
Date: 03/31/2000 1:57:43 PM
Priority: Normal
To: Jon Hale
Subject: Fwd:City of Tacoma Habitat Conservation Plan

Forwarded w/Changes

Author: "Hyink, Shirley E" <Shirley.Hyink@PSS.Boeing.com> at FWS
03/31/2000 11:39:13 AM
To: "tim_romanski@fws.gov" <tim_romanski@fws.gov> at FWS
Subject: City of Tacoma Habitat Conservation Plan

Forward Header

Subject: City of Tacoma Habitat Conservation Plan
Author: "Hyink, Shirley E" <Shirley.Hyink@PSS.Boeing.com>
Date: 03/31/2000 11:39 AM

1 The City of Tacoma Habitat Conservation Plan for the Green River Watershed is inadequate and needs to meet a higher standard in order to receive a permit.

2 Provisions to preserve existing salmon habitat, and to restore lost habitat, must be part of the plan. This should be accomplished by providing a fish ladder to get salmon and steelhead above the dam and by leaving more water in the Green River below the dam.

3 The reservoir should not be enlarged as this will adversely impact wildlife habitat. Water conservation is the answer, not a larger reservoir.

4 Finally, the city should not allow any more logging on its land. Logging on these lands will have a devastating impact on water quality and wildlife habitat, including fish habitat.

5 The City of Tacoma should be required to incorporate all of these provisions in order to obtain a permit. The currently proposed Habitat Conservation Plan is not adequate. Please hold them to a higher standard with a plan that will actually conserve habitat!

Thank you,
Shirley E. Hyink

Date: 03/28/2000 3:37 PM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:Green River HCP

Author: Tim Romanski at 1PO-OLES
Date: 03/28/2000 3:37:51 PM
Priority: Normal
To: Jon Hale
Subject: Fwd:Green River HCP

Forwarded w/Changes

Author: Judi Moccia-Sattler <MocciJu@goodsamhealth.org> at FWS
03/28/2000 1:50:29 PM
To: "tim_romanski@fws.gov" <tim_romanski@fws.gov> at FWS
Subject: Green River HCP

Forward Header

Subject: Green River HCP
Author: Judi Moccia-Sattler
<MocciJu@goodsamhealth.org>
Date: 03/28/2000 1:50 PM

It is my understanding that you are working on the Tacoma Habitat
Conservation Plan for operations in the Green River Watershed.
Please consider the following in your plan:

1 * A fish ladder to get the salmon above the dams, or preservation and
restoration of habitat in the lower Green River.

2 * Allow the Green River below the damn to flow as freely and naturally
as possible (as when salmon evolved).

3 * Do not enlarge the reservoir; it would eliminate important wildlife
habitat.

4 * Water conservation must be the first way to get municipal water
supply, not more water diversions.

5 * No more logging on City land; these forests are needed for fish and
wildlife habitat and clean water.

6 * River recreation water flows for kayaking and rafting must be
enhanced without harm to salmon.

Thank-you for your attention.

Judi Moccia-Sattler RN
Heart Failure Management Program
253-445-5072 (ext. 5072)
Pager:253-280-8565
Fax: 253-770-5175
Moccij u@goodsamhealth.org
<mailto:Moccij u@goodsamhealth.org>
e-mail

"The only rational way of educating is to be an example."
Albert Einstein

Date: 04/03/2000 8:00 AM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:salmon

Author: Tim Romanski at 1PO-OLES
Date: 04/03/2000 8:00:24 AM
Priority: Normal
To: Jon Hale
Subject: Fwd:salmon
---------- Forwarded w/Changes ----------
Author: Noel Rodriguez <rodnoel@sprintmail.com> at FWS 04/03/2000 12:38:38 AM
To: tim_romanski@fws.gov at FWS
Subject: salmon

Forward Header

Subject: salmon
Author: Noel Rodriguez <rodnoel@sprintmail.com>
Date: 04/03/2000 12:38 AM

1 I'm writing to urge you to do your part to save our salmon. The draft
2 of Tacoma's Habitat Conservation Plan for the Green River needs to
ensure that spawning and protective shore habitat will be preserved and
3 a fish ladder will aid the salmon over the dams. The river needs more
water instead of enlarging the reservoir or diverting water. Finally no
4 more logging should take place on city lands. We need our forests to
provide shade for spawning salmon. Thank you for your time, sincerely,
Christina Rodriguez

Date: 03/30/2000 1:13 PM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:Tacoma's Habitat Conservation Plan for the Green River

Author: Tim Romanski at 1PO-OLES
Date: 03/30/2000 1:13:24 PM
Priority: Normal
To: Jon Hale
Subject: Fwd:Tacoma's Habitat Conservation Plan for the Green River
---------- Forwarded w/Changes ----------
Author: Bernita K Sorensen <"bj2522"@sttl.uswest,net> at FWS
03/30/2000 11:53:01 AM
To: tim_romanski@fws.gov at FWS
Subject: Tacoma's Habitat Conservation Plan for the Green River

Forward Header

Subject: Tacoma's Habitat Conservation Plan for the Green River
Author: Bernita K Sorensen <"bj2522"@sttl.uswest,net>
Date: 03/30/2000 11:53 AM

1 I am writing to urge changes in the City of Tacoma's Habitat Conservation Plan for the Green River. A higher standard must be met for Tacoma to receive this permit! The following are crucial:

2 -Preserve and restore spawning and protective shore habitat in the lower Green River. Add a fish ladder to get salmon and steeled above the

3 dams.

4 -Leave more water in the river below the dam for salmon and water quality as well as for recreational uses such as boating

5 -DO NOT enlarge the reservoir; that action would eliminate important wildlife habitat

6 -Water conservation must provide for municipal water supply, not more water diversions

7 -NO MORE LOGGING on the City's land; these forests are needed for fish and wildlife habitat and for clean water.

Thank you for your consideration in this extremely important matter.

James and Bernita Sorensen
3102 North Alder
Tacoma, WA 98407
(253)759-9660

Mar. 27, 2000

US Fish and Wildlife Service
510 Desmood Dr. SE # 102
Lacey, WA 98501

Dear F & W:

1 I am writing to comment on the Habitat Conservation Plan proposed by the city of Tacoma for the Green River Watershed. This plan is being developed at a very critical time for fish habitat. Actually, that can be said from now on, which makes a long-range proposal like this one so critical.

At the minimum, this plan should:

2 1. Preserve and restore spawning habitat
3 2. Keep the temperature of the water cold enough to support salmon by keeping an adequate amount of water in the river at all times
4 3. Under no circumstances expand the capacity of the reservoir
5 4. Call an immediate halt on all logging in the area, pending further review
6 5. Put more money and effort into water conservation.
7 6. Allow and encourage innovative water conservation measures.

Thank you for your consideration.

Very Sincerely,

Keith Peterson

IND-20

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE

MAR 29 2000

LACEY, WA
RECEIVED

March 11, 2000

Shelly Baur
26203 131st Place SE
Kent, WA 98031

US Fish and Wildlife Service
510 Desmond Drive SE #102
Lacey WA

Dear US Fish and Wildlife Service:

1 Everyone in the Seattle/Tacoma water corridor is affected by water use and has an affect on it, since we are all connected. Regarding Tacoma's plans for drawing more water from the Green River to support future growth is unnecessary, shortsighted, and ignores the ESA listing of the salmon and other species under threat. Kent is one of the communities Tacoma is looking asking to pay for the pipeline and buy water, but I can tell you that Kent (and elsewhere) would be much better served by ramping up
2 conservation. Looking at the rate of water use per household of Seattle city (low) versus the suburbs (high), it is obvious that conservation could adequately provide water for future growth without pain for consumers. Just watching the number of neighbors who water their lawns, etc. during peak summer hours makes this obvious. So, please do not
3 allow pipeline 5 to be built, because of its drain on water that is needed for habitat and waste money and other resources for people.

4 Likewise, don't allow logging to happen in the watershed. This should be obvious for water quality, but apparently not to those eager to satisfy developers and loggers. The
5 protected watershed size should instead be expanded to provided for water quality and to give us a double duty second use of this land, for habitat. Eliminate the allowance within
6 the HCP that enables destruction to habitat that harms endangered or threatened species.
7 Stop the trucking of fish past the dams; fish ladders are the minimum we can do to help salmon. Aid flows by working on conservation of water and reworking the river so flows
8 become more natural.

Sincerely,

Shelly Baur

C. Howe
WWU
236 Fairhaven
B-ham, WA 98225
25 March 2000

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
MAR 28 2000
LACEY, WA
RECEIVED

U.S. Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98501

To the concerned,

I am very pleased that there is, in existance, a Habitat Conservation Plan. However, I would like to improve this plan so it's original goals are
1 actually successful. This is a plan to conserve habitat, especially for the endangered species of spotted owls, marbled murrelets, chinook salmon and bull trout. The protection of these animals must be first priority,
2 not to add money to huge logging corporations. If necessary, all commercial logging should end.

Another crucial aspect: water conservation to
3 provide enough instream flows for salmon. If a fish ladder will not work for the huge dam,
4 large amounts of time and energy needs to be spent on restoring a good spawning habitat down stream. Cutting down hard on water conservation
5 laws would help dramatically. Thank you for your time.

Sincerely,

Cassandra Howe

Date: 03/27/2000 7:41 AM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:HCP for Green River

Author: Tim Romanski at TPO-OLES
Date: 03/27/2000 7:41:40 AM
Priority: Normal
To: Jon Hale
Subject: Fwd:HCP for Green River

---------- Forwarded w/Changes ----------

Author: Jill McGrath <cbcnews@cascade.org> at FWS 03/26/2000 10:43:51 AM
To: tim_romanski@fws.gov at FWS
Subject: HCP for Green River

Forward Header

Subject: HCP for Green River
Author: Jill McGrath <cbcnews@cascade.org>
Date: 03/26/2000 10:43 AM

Dear Mr. Romanski:

1 I am writing regarding the Draft EIS for the HCP for the Green River. I feel that the plan is inadequate for protecting endangered species. Tacoma

2 should follow the example of Seasttle in ending commercial logging on its lands in the watershed. Tacoma should also make sure there is

3 adequate instream flows for samlon and recreation in the lower river.

4 More water conservation is needed, not more water diverted from the river.

5 The salmon are nearly gone -- let's do everything we can to save them. If a fish ladder will not work to get the salmon over the 235-foot

6 barrier of the dam, then substantial habitat preservation and restoration downstream must be done to offset the loss of spawning habitat.

Thank you for considering my views.

Sincerely,

Jill McGrath
5743 Palatine Ave N
Seattle, WA 98103

MAR 20 2000
LACEY, WA
RECEIVED

3/16/2000

Dear US. Fish and Wildlife Service:

1 I oppose the Draft EIS Tacoma issued for its Habitat Conservation Plan for the Green River! Please do not give the utility a 50 year Incidental Take Permit.

2 Tacoma must do what Seattle has done and end commercial logging on its watershed lands.

3 Habitat preservation and restoration downstream along with water conservation needs to be done to help offset the dam.

4 Tacoma is spending a ton of money on fiber optic capabilities for downtown while neglecting the health of its water supply eco-system.

5 15,000 acres Tacoma owns in the watershed should be used for habitats for fish and wildlife.

Thanks

Mr. & Mrs. J. C. Begin
2754 NE 89th St
Sea. Wa. 98115

March 4, 2000

Tim Romanski
USFWS
510 Desmond Dr. SE #102
Lacey, WA 98503-1263

Mr. Romanski:

I am writing in concern for the Draft Habitat Conservation Plan (D-HCP) for the Green River, which allows for "take" of endangered species. A landowner can continue harmful activities if the utility mitigates habitat losses. Although Tacoma industry water needs have declined, the Tacoma Public Utilities want to divert an additional 100 cfs from Howard Hanson dam for the Pipeline 5 Project for municipal uses. However, raising the reservoir level will flood valuable habitat for threatened and endangered species such as bald eagle, marbled murrelet, spotted owl, grizzly bear, gray wolf, peregrine falcon, and bull trout. The HCP would be implemented for the next 50 years, a significant impact. Thank you for taking these issues into consideration.

1
2
3
4

Sincerely,

Julie Alaimo
527 NE 86th St. Apt. B
Seattle, WA 98115

Date: 03/22/2000 3:42 PM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:Green River Habitat Conservation Plan

Author: Tim Romanski at 1PO-OLES
Date: 03/22/2000 3:42:57 PM
Priority: Normal
To: Jon Hale
Subject: Fwd:Green River Habitat Conservation Plan

---------- Forwarded w/Changes ----------

Author: "William H. Weber" <billweber@juno.com> at FWS 03/22/2000 2:38:38 PM
To: tim_romanski@fws.gov at FWS
cc: rmeyenhouse@tobemocean.com at FWS
Subject: Green River Habitat Conservation Plan

---------- Forward Header ----------

Subject: Green River Habitat Conservation Plan
Author: "William H. Weber" <billweber@juno.com>
Date: 03/22/2000 2:13 PM

Tim,
1 Please preserve and enhance the Green in its natural state to the maximum
extent possible considering present installations: i.e., add a
2 fish
3 ladder but do not enlarge the reservoir or permit further hardening of
4 stream banks anywhere; stop logging within the watershed, and
5 encourage
water conservation is a major source of new supply.
Bill

VANCOUVER, WASHINGTON

Aerial view of Vancouver, the Columbia River which separates Washington and Oregon, and Mt. Hood, Oregon.

SPC-0515 Photo by Ackroyd Photography, Inc.

Smith-Western Inc.

PORTLAND OR 972 PM 14 MAR 2000

0 86 33 USA

America

POST

Dear USF&WS,

PLEASE ENTER THE CARD INTO THE PUBLIC RECORD WITH REGARDS TO THE DEIS FOR

1 TACOMA'S HCP FOR THE GREEN RIVER WATERSHED. PLEASE DO NOT ISSUE AN I.T.P. UNDER THE ESA.

TACOMA NEEDS TO DO AS SEATTLE HAS

2 DONE AND END COMMERCIAL LOGGING ON ITS LANDS IN THE WATERSHED. ALSO, TACOMA MUST PROVIDE ADEQUATE INSTREAM FLOWS

3 FOR SALMON & RECREATION IN THE LOWER RIVER. THANK YOU,

ROBERT WATTER
7624 NE 145 AV. VANCOUVER, WA. 98682

USF&WS
510 DESMOND DR. SE
#102
LACEY, WA
98503

Pat. by Smith-Western, Inc., 1153 N.W. Glisan St., Portland, Oregon 97209 • (503) 227-6101

PLEASE DO NOT WRITE BELOW THIS LINE

29957

Idaho Rivers United works to protect and restore Idaho's wild rivers and native fisheries. We support bypassing the four lower Snake River dams to restore the Snake River's legendary salmon and steelhead runs.

Dear Mr. Romanski,

1 HCPs are powerful documents which deeply impact habitat and species for an enormous length of time. Such significant

2 decisions should not be made until adequate study of the impacts is made. That study includes third party and

3 public comment. 8 weeks for the review of a large EIS + HCP for the Green River is completely inadequate. Please extend the comment period for 30 days. –

Sincerely,

Theodore Dodge

Kirkland, WA 98033

Tim Romanski
Green River EIS & HCP
USFWS
510 Desmond Dr. SE #102
Lacey, WA 98503-1263

Representation – "Restoring Wild Salmon & Steelhead to the Snake River"
©1998 Moote Dotock
Poster size: 24" x 32"
Idaho Rivers United, Box 4210, Moscow, ID 83843
(208) 343-7481
www.idahorivers.org

RE: Tacoma's Habitat Conservation Plan (HCP) for its Land & Operations in the Green River Watershed & Related EIS

Dalice Snider
32920 18th Ave S.E.
Auburn, WA 98092

To:
Jim Lanerolle -
U.S. Fish & Wildlife Service
510 Desmond Dr. S.E. #102
Lacey, WA 98503

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
MAR 13 2000
LACEY, WA
RECEIVED

March 9, 2000

Dear Mr. Lanerolle -

1 Please do everything possible to save wild Chinook Salmon runs on the Green River.

2 The HCP should end logging on Tacoma's land.

3 Do not make the Green a Sacrifice Watershed - allowing degradation in favor of saving other watersheds.

4 Please preserve proper stream flows for protecting salmon during all life stages.

5 Please do not allow additional water storage damming - water sources should come from Conservation and reclamation.

6

Thank you

Dalice A. Snider
volunteer ~~[illegible]~~

Date: 03/14/2000 7:35 PM
Sender: thelmagower@hotmail.com ("Thelma R. Gower" <thelmagower@hotmail.com>)
To: tim_romanski@fws.gov
bcc: Tim Romanski
Priority: Normal
Subject: Public Comment On Tacoma's Draft EIS For The Green River

Dear Mr. Romanski,

1 I am a registered voter of this state. I also know the "back roads" and "high country" of this state extremely well. Please register this email as a sign of disgust that the city of Tacoma cannot come up with something better for the Green River "habitat" than the currently issued draft EIS.

2 At a minimum, such a document should equal what Seattle has done to date.

3 At a maximum, there must be recognition that taking water out of the river is tantamount to baking the fish (i.e., killing them).

4 Furthermore, if a fish ladder over a 235-foot dam barrier isn't going to work, then extra consideration of downstream habitat preservation and restoration (to offset the killing of even more spawning salmon) must be included.

5 With this document, the city of Tacoma is proposing nothing less than both the continued killing of trees and fish as well as the continued degrigation of its own water supply. Such a stance is insane.

Sincerely yours,

Thelma R. Gower
2508 164th Avenue, N. E.,
Bellevue, Washington 98008-2317

Get Your Private, Free Email at http://www.hotmail.com

Date: 03/31/2000 7:12 AM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:Green River Watershed planning

IND - 30

Author: Tim Romanski at 1PO-OLES
Date: 03/31/2000 7:12:20 AM
Priority: Normal
To: Jon Hale
Subject: Fwd:Green River Watershed planning
---------- Forwarded w/Changes ----------
Author: "Startzel , Danielle" <danielle.startzel@cotelligent.com> at FWS
03/30/2000 5:26:44 PM
To: "tim_romanski@fws.gov" <tim_romanski@fws.gov> at FWS
Subject: Green River Watershed planning

Forward Header

Subject: Green River Watershed planning
Author: "Startzel , Danielle" <danielle.startzel@cotelligent.com>
Date: 03/30/2000 5:26 PM

Hello,

I am a new student at the University of Washington studying watershed
management and wildland conservation. Although I am just learning about the
importance of things such as instream flows, riparian zones, water
conservation and environmental mitigation, they are things that I know are
1 important to the survival and health of local species and humans as well.
It is important that we start doing whatever we can now, to avoid additional
costs to us in the future. It doesn't make sense to continue wasting our
resources when we know the consequences of those actions. I urge you to
take the necessary precautions when creating your Draft Habitat Conservation
2 Plan to keep more water in the streams, to stop logging along
3 riparian
4 zones, to create a fish ladder for spawning Chinook in the Green River and
to maintain healthy long-term habitat for the wildlife in the
5 Green River
watershed. I feel it is necessary to set an example and to show that we as
6 humans as a species can be contributors to the Earth and not just greedy
parasites taking from everything else.

Thank you,

Danielle Startzel

U.S. FISH & WILDLIFE SERV
WESTERN WA OFFICE

FEB 25 2000

LACEY, WA
RECEIVED
2/28/00

Tim/Jon
Take Action

February 22, 2000

Peter and Naomi Rimbos
19711 241st Ave SE
Maple Valley, WA 98038

U.S. Fish and Wildlife Service
510 Desmond Drive SE
#102
Lacey, WA 98501

Sir/Madam,

1 Tacoma Public Utilities has released its draft Green River Habitat Conservation Plan (HCP) for its Upper Green River Watershed lands and water supply. The U.S. Fish and Wildlife Service has released its companion draft Environmental Impact Statement (EIS). This letter is to provide comments on the draft HCP. The Tacoma draft HCP needs improvement to ensure the best for salmon, wildlife, and the forest on their land. Specifically, please note the following improvements that should be incorporated in the HCP:

2 1. End all logging in the watershed—forests are needed for the natural ecosystem and to ensure a long-term, clean water source for the people of the region.
3 2. Forego additional water storage to ensure more wildlife habitat is not eliminated.
4 3. Purchase more land in the watershed to protect forest from logging companies.
5 4. Ensure the ESA is followed by restoring endangered and threatened plants, animals, and fish that belong in the watershed and are integral to its long-term health.
6 5. Recognize salmon spawning habitat below dams is impaired by interference with sediment movement.
7 6. Build fish ladders around the two dams so ineffective trucking of fish is not required.
8 7. Work with the Corps of Engineers to make flows more natural for the salmon.
9 8. Stop additional water diversions to fuel urban sprawl and instead emphasize water conservation, because salmon need water in the river to thrive.
10 9. Restore the Green River to a place of natural beauty again so people would want to hike, fish, and kayak there.

11 We must help forests, salmon, and other creatures survive, because we can't afford the cost of our water supply if it means their deaths. Thank you for listening.

Very truly yours,

Peter Rimbos

Naomi Rimbos

Date: 03/30/2000 7:31 AM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:City of Tacoma Habitat Conservation Plan

IND - 32

Author: Tim Romanski at TPO-OLES
Date: 03/30/2000 7:31:18 AM
Priority: Normal
To: Jon Hale
Subject: Fwd:City of Tacoma Habitat Conservation Plan

---------- Forwarded w/Changes ----------
Author: "len elliott" <len_elliott@hotmail.com> at FWS 03/29/2000 8:23:19 PM
To: tim_romanski@fws.gov at FWS
Subject: City of Tacoma Habitat Conservation Plan

Forward Header

Subject: City of Tacoma Habitat Conservation Plan
Author: "len elliott" <len_elliott@hotmail.com>
Date: 03/29/2000 8:23 PM

Dear Mr. Romanski,

I am writing about the proposed Habitat Conservation Plan developed by the
City of Tacoma related to its use of the Green River Watershed. I am first
of all concerned about the length of the permit (fifty years). Lots of
1 things can happen in that time period that cannot be foreseen today. I say
shorten the permit, see how things go and adjust the HCP based on
performance and circumstances.

If the fifty-year time span is a given, I would like you to demand that the
2 City of Tacoma do whatever is necessary to protect salmon, wildlife,
forests, river flows and other uses of the Green River. I have lived along
the Green for almost nineteen years and have witnessed lower flows and fewer
3 fish. There are many factors responsible for these events, but every time I
read where Tacoma wants more water, I say to myself. Water from where? Are
we willing to dry up the Green, so Tacoma can have more water.

In particular, I would like to see Tacoma help with the
4 preservation and
restoration of salmon spawning grounds and other fish habitat.
5 Then, leave
6 more water in the river, leave the reservoir the size it is,
7 develop a water
conservation plan for city users, and stop logging the
8 watershed.

Especially in this era of listed salmon and other species, how can we let
9 the City of Tacoma have their way with a river system that city residents
never see??

Thank you for your consideration of my position.

Sincerely,

Len Elliott
2006 Riverview Drive NE
Auburn, WA 98002

Get Your Private, Free Email at http://www.hotmail.com

Harry Romberg
11538 17th Ave. N.E.
Seattle, WA 98125-5112

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
MAR 30 2000
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RECEIVED

March 27, 2000

Green River HCP Comments
U. S. Fish & Wildlife Service
510 Desmond Dr. SE, #102
Lacey, WA 98501

Dear USFWS:

1 I am writing with a great deal of concern about the City of Tacoma's Habitat Conservation Plan (HCP) for its lands in the Green River Watershed.

2 This is a 50 year plan and as such must protect endangered and threatened species and should also protect species of concern so they do not end up in a more critical state, for a considerable time. It therefore must be conservative enough to succeed in this effort or it will not have met the goals of the Endangered Species Act (ESA). In fact, that since the Green River Watershed has been so heavily impacted by logging and other operations for decades, by Tacoma and others, that the HCP must be extremely strong in order to actually aid in the recovery of these species.

3 Tacoma should be required to do everything possible to protect salmon, wildlife, forests, river flows and recreational uses of the Green River. Full recovery of endangered species must be the standard, not just their bare survival, if that. Much of Tacoma's lands border the Green River and thus become even more critical to species survival. However, 2 dams block salmon from miles of spawning habitat, Tacoma has in the past and insists on continuing logging operations, and in addition diverts huge amounts of water, much of it just going to water lawns in the summer.

4 Habitat should not be allowed to diminish. It should, in fact be enhanced. Spawning and protective shoreline habitat must be protected and even improved in the lower Green River.

5 Logging on Tacoma City land should be stopped. Tacoma should not be trying to make a profit off of their lands at the expense of the resident species and in fact their own water quality.

6 However, if, in spite of my personal and I believe well-founded objections, Tacoma is allowed to continue logging at all in this severely degraded watershed, this means far more than the meager buffers required in Washington's Forest Practices regulations, for instance. This means substantial buffers that will truly protect the river and environs by almost any scientific standards. These buffers should not be a compromise that a handful of scientists think might be adequate, but buffers that the vast majority would agree would truly protect the river.

7 The reservoir should not be enlarged. This would eliminate habitat above the dams by drowning

8 it out and would reduce flows below them in order to maintain the increased water levels. More water should be left in the river itself to increase instream flows below the dams for salmon. The

9 salmon need cold, clear running water and this comes from a flowing river, not a slack water reservoir. This would have the added benefit of higher water quality and improved recreation possibilities in the river itself.

10 A fish ladder should be constructed, if possible, to get salmon past the existing dams into the habitat above. Although the existing reservoir might not be as useful to the salmon as the original river, it's far better than the river just ending at the dam. Trucking, hatcheries, and untried, uncertain technologies should not be a substitute here because the situation is so critical. The dams are so high now, I believe that a fish ladder may be difficult to construct. The difficulty would be magnified a great deal if the current reservoir is increased because the fish ladder would have to go even higher.

11 Water conservation must be first and foremost before even considering raising the reservoir level or allowing any increased diversions from the river. Tacoma has a very poor record on this and has hardly tried at all to reduce consumption. They have had so much water, they didn't see a need to conserve. This must change or their activities in the watershed curtailed even more. Tacoma and the entire region are seeing staggering growth rates and conservation of water, one of our most valuable resources, must be of the utmost concern or all of our watersheds will continue to degrade.

12 I urge you to allow only the strongest, conservative activities on Tacoma's lands covered by this HCP. If this doesn't happen now, in 50 years it will be too late. Adaptive management, though

13 a lofty goal, is difficult to enforce. Activities are simply too hard to change once they've been adopted in a document at formal as an HCP. Please keep in mind, the goal of the ESA and the HCP is to preserve and enhance the species in the watershed. This should not be left up to luck but by a strong and conservative HCP.

14 Thank-you for the opportunity to comment and I hope you will see that this HCP is a good one for the fish and wildlife.

Sincerely,

Harry Romberg

Harry Romberg

Mary A. Fries 253-272-9192
620 North C St
Tacoma, WA 98403-2800

March 29, 2000

Tim Romanski
U S Fish and Wildlife Service, 510 Desmond Dr S.W., Suite 102
Lacey WA 98503-1263

Dear Sir:

1 I attended the public meeting in Tacoma on Feb. 10, concerning Tacoma Water's Draft HCP and the draft EIS on the upper Green River and the pipeline 5 proposal, which includes an intertie with water districts in King Co. I also have read some of the document at the Tacoma Library.

2 As a resident of Tacoma since late 1947 (52 years), I have long appreciated the excellent quality of the city's water in contrast to water available in some other areas, especially when obtained from wells. I have found that it is often possible to tell when the city has switched to water use from wells in Tacoma.

3 I was especially glad to hear of measures to protect the river water's cleanliness, such as trapping and barging fish from below the diversion dam, rather than letting them die when they meet the barrier of the high flood-control dam. I am also happy that the area is closed to the general public. Litter and inappropriate, erosion-causing use of wheeled vehicles seen in open areas, is appalling.

4 The plan seems well-balanced between the various factors which need to be considered. Seven weeks later, I do not remember any personal objections to the plan as described. However, I remember many public statements made at this meeting, with which I disagreed. I am writing to present some counter arguments.

5 Why are Seattle's Cedar River plans held up as a model when they provide little for their neighboring communities?

6 Water supplies are to me more important than boating, rafting and other recreational uses of the river, especially if there is a possibility that such use could be detrimental to salmon.

7 Given the likelihood of global warming which may increase floodwaters in winter, and which because of reduced snowpack, may result in reduced summer and fall flows, it seems that the flood control dam may help even things out more appropriately for both fish and humans. The cost of restoring salmon habitat and getting salmon past the Howard Hanson Dam ought to be born equitably by the people who benefit from the river's water and the many industries and residents in the lower Green Valley who benefit from the flood control. What I'm saying here is that if more needs to be done for salmon than is provided in this plan, a way should be found to charge those who benefit from the flood control. (I realize this will be politically complicated; after jealously watching surface water management activity in King Co., I recently read that there is a push to eliminate the stormwater tax which supports the effort.)

8 Decisions about logging should involve protection for salmon and other wildlife, and shade for the winter snowpack. I understand the additional storage behind the H H dam will flood an old homestead pasture used in winter by elk, and that the Muckleshoots are interested in elk as well as salmon. Providing replacement pasture may involve some logging.

9 Provisions of HCPs for other ownerships in the watershed need to be related but not drive Tacoma Water's HCP. Species protections provided by these other HCPs should be included in the background information for this one. Again, Tacoma Water should not have the sole responsibility for saving salmon. Closeness to the river of its current parcels may preclude much logging. I would suspect that water quantity and natural storage capacity in the snowpack in the watershed are highly dependent upon activity by other owners.

(more)

10 One other reason for my opposition to permanent logging bans: I was a young resident of this state when all the hype about sustainable timber management in Olympic National Forest policies, in Weyerhaeuser ads and media was current in the 1940s to the 1960s. It sounded great, but the excessive cutting afterward was illogical in that it counted only existing trees, and ignored such things as damage to steep slopes, to water quantity and quality, and more lengthy restoration times at higher elevations and other varied conditions in the mountains. Too much reliance also was placed on trees available elsewhere for continued cutting, which is not a proper interpretation of sustainable timber production.

11 Now I personally am very upset that logging restrictions are driving up the value of my small 70-acre piece of timber on a ridge between the Chehalis and Cowlitz watersheds. It was a clearcut when our family acquired it. I would like to see it grow into the more mature, at least 100-year-old stand, which is the kind of timber that mills drool over on public lands and single-issue environmentalists insist should not be logged there. However, I won't live this long, and inheritance taxes will require cutting whenever I die. There also is a liability problem of houses built next to the boundary, because state growth management law and county planning regulations cannot compete against homeowners and developers. Western Washington could do a better job of growing trees, but economics are not favorable in any case, and whoever owns trees on waterways is in real trouble because of the salmon crisis. Rather than simply concentrating on logging bans, I think environmentalists would do more good by campaigning for lowland timber-growing capabilities, as providing funds to buy development rights, to buy stream buffers, etc.

Good luck,

Mary A. Fries

Mary A. Fries
620 North C St
Tacoma, WA 98403-2800

Copies to: John Kiesner
Mike Grady

1506 S. G. St. Apt. 1
Tacoma, WA 98405
March 23, 2000

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
MAR 27 2000
LACEY, WA
RECEIVED

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE. #102
Lacey, WA 98503

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS).

Dear Mr. Romanski,

1 After attending the meeting on February 29th, I walked away knowing that this plan was going into action no matter what any public citizen had to say for or against this particular HCP. I feel assured that the agencies involved such as the US Fish and
2 Wildlife Service, the National Marine Fisheries Service (NMFS), and the Corps of Engineers' will be taking an active role in requiring the utmost care of our never ending depletion of natural resources for human demands. Tacoma Public Utilities HCP shows great concern for our endangered species, but I still ponder, is the need for water so great around the surrounding area that we need to store 20,000 acres of water and
3 further endanger the already endangered species? The surrounding areas plan to grow which means more money for their communities and more money for Tacoma Public Utilities for selling the water to the surrounding areas. This is progress. My concerns in
4 reference to the HCP are the trap and haul of Salmon and the introduction of non-native plants for native species.

5 During the meeting, Paul Hickey, TPU's Fisheries Biologist made the comment that the trap and haul of the Salmon was experimental, and Deputy Water Superintendent John C. Kimer advised that there is no back up plan if this attempt fails. So, are we planning to cripple an already crippled species? Is the need for 20,000 acres of water storage that critical that we are willing to lose another endangered species? On the other hand, if this experiment works it will set a precedent for other communities facing similar growth patterns. Is this the hope of many?

6 The introduction of non-native plants for native species dining and nesting does not compute. It is known that native species do not recognize non-native plants as a dining and nesting resource. There are many documented facts in the science world that non-native plants tend to over power and kill the native plants because native species do not see them as a resource for food or nesting. Yet, another natural resource disappears. Will the animals eventually adapt?

7 Ron Sime, King County Executive wrote "*The Endangered Species Act and HCPs: A Summary.*" Sime writes, "as discussed in the summary of the ESA, a non-federal entity (such as a business, landowner or government) may incidentally 'take' (harm) a listed species through an approved Habitat Conservation Plan (HCP). In an HCP, a set of actions that protect and benefit a listed species serve as mitigation for takes of that species that are incidental to otherwise lawful activities, such as tree harvesting, constructing roads or permitting development." I question again, "Are we in need of
8 storing 20,000 acres of water or do we just want to store this amount of water in hopes that TPU and the surrounding communities prosper?

9 Scientist Camille Parmesan who studies one of the serious environmental effects of the human population explosion says, "I think we have to stop thinking in terms of everything being stable. We can't just fence off some areas and expect them to be Ok. Humans have made Earth a managed system, and we've got to think in terms of stewardship" (Biology Concepts & Connections pg. 712).

Sincerely,

Shari R. Gachet

Shari R. Gachet

IND - 36

4316 Whitman Ave. N.
Seattle, WA 98103
Mar. 18, 2000

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
MAR 23 2000
LACEY, WA
RECEIVED

Tim Romanski
U.S. Fish & Wildlife Service
510 Desmond Dr. SE, #102
Lacey, WA 98503

Dear Mr. Romanski:

I am writing to comment on the draft EIS and Habitat Conservation Plan (HCP) for the City of Tacoma's lands in the upper Green River watershed.

1 I strongly urge that logging be brought to an end on the city's lands. The City of Seattle HCP in the Cedar River watershed accomplishes this. I have
2 no problem with thinnings in younger plantations less than about 40 years old, but it makes no sense for restoring late-successional characteristics to log in mature forests. As we found in the Seattle HCP, the revenues from logging are marginal and not worth the possible impacts to water quality, riparian areas, cumulative watershed impacts, and late-successional habitat for candidate, threatened, or endangered species.

3 For example, in EIS work leading to Forest Service easements to Plum Creek Timber Co. in the upper Green, Larch Mountain salamanders were discovered, and major mitigation was required. The mitigation drastically reduces the profitability of logging operations.

4 Tacoma lands include portions of uninventoried roadless areas, particularly the Kelly Butte roadless area, much of which was preserved from logging, roads, and motorized recreation by act of Congress in 1999.

5 I encourage USFWS to work with Tacoma to encourage the City to acquire additional lands in the upper Green, particularly where needed to round out late-successional habitat, roadless areas, and riparian zones. Such acquisition can be very helpful to mitigate ongoing impacts of City activities on fish and wildlife species, and to keep more of the watershed in a forested state.

6 The HCP must also require that something close to a natural flow regime is reestablished. This can be
7 accomplished through more aggressive water conservation programs (Tacoma is far behind other municipal water utilities on this). Even flood flows are important for healthy watersheds.

8 Off-site mitigation, e.g. purchase of habitat along the lower Green (below the reservoir) will also help to protect and restore salmonid species. I would emphasize purchases

Mark Lawler letter p. 2

of land now and restoration later.

9 Tacoma has long inhibited recreational uses of its lands. Since the watershed is not closed to the public (people drive in over Stampede Pass), Tacoma should make more of its lands available to the public for recreation. Hiking trails that access National Forest lands are often not easily accessible to the public if they start on City lands. For example, the Lester Creek and Sawmill Creek trails start on City lands near the Green River, but there are no formal trailheads, signs, or parking areas. This HCP/EIS is a chance for the City to improve public access, particularly since the Kelly Butte roadless area is now partly protected on the National Forest.

10 Please send me a summary of the final HCP/EIS when completed.

Sincerely,

Mark Lawler

Mark Lawler
Tel. 206 632-1550

U.S. FISH & WILDLIFE SERVICE
WESTERN WA. OFFICE
MAR 14 2000
LACEY, WA
RECEIVED

March 9, 2000

Tim Romanski
U.S. Fish and Wildlife Service
510 Desmond Drive, S.E.
Suite 102
Lacey, WA 98503-1263

Dear Sir,

1 After reviewing the Tacoma Water Draft Environmental Impact Statement proposing issuance of a multiple species incidental take permit, the following comments are submitted for consideration during the decision-making process. It is clear that consumption of water in the region is quickly approaching the limit of the currently available resources. I also believe that it should be clear to decision-makers that development of Tacoma Water's Second Diversion Water Right is a temporary solution due to increased demand and resource availability. One can only hope that when development once again reaches the limits of water supply, technology and engineering have provided alternate courses of action besides additional diversions. Tacoma Water has developed a Habitat Conservation Plan that appears to minimize and mitigate the impact of the additional water diversion while improving the quality of the surrounding habitat for the species listed on the take permit. The comprehensive monitoring plan and adaptive management policies provide a framework for successful species enhancement. The key to success of the management plan lies in meticulous monitoring and adapting management policies that address changing or unforeseen circumstances. In other words, the issuance of the incidental take permit should not be viewed as the final objective, but rather a stepping off point for a larger objective which bestows more responsibility and requires more vigilance. I am in support of the proposed alternative with regards to water withdrawal, and alternative C: No Timber Harvest with regards to land management. The following concerns are provided:

2 1. **Water Reuse**- Many cities across the nation have successfully implemented substantial water reuse programs, and without knowing the particular aspects of the region, it is impossible to critique. However, the section of the DEIS discussing water reuse studies did not address many possible uses for reclaimed water other than paper mill process water and irrigation. Water reuse technology is always improving and should be constantly considered and implemented as economically feasible. The DEIS did not address future water reuse development programs or resource commitments.

3 2. **Customer Base**- Table 2-2, depicting Tacoma Water's customer base as of 1998 gives conflicting figures for daily water use. The table shows water use as 22,613 million gallons per day (mgd). This directly conflicts with Figure 2-4, which shows average daily demand between 60-70 mgd. Please clarify, as the former number is exceedingly large.

4 3. **Effect of Additional Water Storage program**- The DEIS states that the USACE maintains responsibility for water storage impacts associated with the AWS program. Those impacts are addressed in a separate environmental impact statement, but are not discussed. The ability to implement the AWS program appears to be vital to the decision to authorize the Second Water Right Diversion, and should be summarized in this document.

5 4. **Acceptable Take**- Although permitted for incidental take, at what point is the take unacceptable. The implementation agreement states that no modifications may be made to the HCP that would result in increased take. However, assuming that the HCP plan is being implemented as agreed upon by the Services and species population numbers are being reduced, at what point can parties legally intervene?

309 NORTH BUSEY AVE APT 12
URBANA, IL 61801

6 5. **Timber Harvest**- Is the only purpose for the harvesting of timber on Tacoma Water lands to defer economic cost of HCP implementation? The costs for maintaining sustainable multiple use resources should be transferred to the consumer. This would increase conservation efforts, increase economic feasibility of water re-use programs, and emphasize the fact that resources are not limitless. I cannot imagine another resource that is sold that does not operate on supply and demand economics that is not subsidized.

Respectfully,

Jeff Simons

Date: 04/03/2000 7:23 AM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:Green River DEIS/DHCP comments

Author: Tim Romanski at 1PO-OLES
Date: 04/03/2000 7:23:29 AM
Priority: Normal
To: Jon Hale
Subject: Fwd:Green River DEIS/DHCP comments
---------- Forwarded w/Changes ----------
Author: WesleynBarbara_Brock <wbbrock@mail.whidbey.net> at FWS
03/31/2000 3:11:07 PM
To: tim_romanski@fws.gov at FWS
Subject: Green River DEIS/DHCP comments

Forward Header

Subject: Green River DEIS/DHCP comments
Author: WesleynBarbara_Brock
<wbbrock@mail.whidbey.net>
Date: 03/31/2000 3:11 PM

Dear Mr. Romanski- Below are my comments on the Green River DEIS/DHCP.
Thank you. Barbara Geyer Brock

March 31, 2000

Tim Romanski
U.S. Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

Re:
1. Draft Tacoma Water Habitat Conservation Plan (DHCP);
2. US Fish & Wildlife Service & National Marine Fisheries Service Draft
Environmental Impact Statement (DEIS) for the Proposed Issuance of a
Multiple Species Incidental Take Permit for the Tacoma Water Habitat
Conservation Plan, Green River Water Supply Operations, and Watershed
Protection;
3. Implementing Agreement for the Tacoma Water Division, Tacoma Public
Utilities Habitat Conservation Plan for the Green River, (King County)
Washington, Municipal Water Supply

Dear Mr. Romanski:

I have followed water issues on the Green River for many years and
appreciate the opportunity to comment on the above important documents.
1 Both the DHCP and the DEIS detail the extent of manmade changes on the
Green River ecosystem. With the extent of water diversion, estuary fill,
channelization, etc. it is surprising that the system supports

any life.
1 Over the years man has taken from the river, and now it is time to begin to
repay the costs and give back to the river.

2 I support Alternative 9.3.2 in Tacoma Public Utilities(TPU)Draft Habitat
Conservation Plan. Curtailing logging in the upper reaches of the Green
3 River is the first step towards reversing many years of actions which have
contributed to the decline in fisheries and the ultimate listing of the
Chinook under the Endangered Species Act(ESA). I would support efforts to
4 further improve conditions in the upper Green River through the
decommissioning of unneeded roads, and improvement of culverts and grading
on the remaining roads. Any introduction of exotic plant species in the
5 upper banks of the pool above HHD should be examined very carefully. The
problems with exotic plant species introduced on the Colorado River
immediately comes to mind.

The upper reaches of the Green River above TPU's Headworks, some 66 miles
6 of river, have been basically closed to use, both by fish and by people.
The TPU/MIT (Muckleshoot Indian Tribe) agreement attempts to mitigate for
the tribes losses. I would suggest that loss of use by the rest of the
7 general public also be mitigated. One mitigation should be more natural
flows in the river. Operating Howard Hansen Dam(HHD) so that inflow equals
8 outflow, except in flood conditions, would help both fish and recreational boating(rafting, kayaking, canoeing). Section 4.3.4 of the HCP
recognizes the recreational value of the Green River and the "intense
public interest" in enhancing white water recreational opportunities on the
Green. As another
March 31,2000
Green River DEIS/DHCP comments
Page 2

9 mitigation, TPU should lobby with the US Army Corp of Engineers(USACE) to
regularly include a representative of this public on the Green River Flow
Management Committee(GRFMC) which makes water management decisions on the
operation of HHD.

10 Interwoven among planning and assumptions of the HCP and DEIS are
provisions of the Additional Water Storage Project(AWS). This AWS may or
may not be approved. Assuming conservation measures for the AWS as fact,

slants the discussion of other factors. Rather that plan for additional water storage, which would further stress an already over stressed river system, TPU should focus on additional conservation efforts to reduce the need for additional water. The DEIS, page 2-25 lists significant water saving which could be accomplished, especially by their large commercial users but states these savings are not financially feasible at this time. With the added emphasis of the ESA, this would seem to be the time to reexamine the cost/rate structure to more accurately reflect the true costs
10 of water. Also, I noted with interest the Seattle Times article of March 30 ,2000 which discusses a plan by King County to recycle waste water for industrial use. Seattle already has sufficient water to meet their need through the year 2040, and this new possibility would add to the overall supply. If King County/Seattle Water and TPU both pursue these coming technologies, there will be no need for Additional Water Storage, and possibly no need for the Second Diversion Water Right(SDWR). The river, and the fish, need as much water left in the river as possible, with a minimum of human management.

The request for an Incidental Take Permit raises serious concerns. Much of TPU's DHCP deals with the specifics of process, i.e. how many pieces of LWD, etc., rather with the issues of quantifying results. Clear goals are needed in order to measure whether they are being achieved,
11 or whether changes need to to be made. The assumed goal is an increase in endangered or threatened species. These goals need to be spelled out, then measures to reach them can be proposed, and the success or failure to reach these goals determined, and changes made if necessary. Until this is clarified, I would oppose issuing an Incidental Take Permit.

TPU has expended much time and effort in preparing the DEIS and DHCP for
12 the Green River. However, I feel that additional work is necessary before a decision is made to proceed. Thank you for considering my concerns.

Very truly yours,

Barbara Geyer Brock
2935 74th SE
Mercer Island, WA 98040
wbbrock@mail.whidbey.net

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE

APR 06 2000

LACEY, WA
RECEIVED

Tanja Wilcox
3625 Evanston Ave. N.
Seattle, WA 98103

To:
Mr. Tom Romanski
US Fish and Wildlife Service
510 Desmond Drive SE, Suite 102
Lacey, WA 98503

Dr. Michael Grady
National Marine Fisheries Service
510 Desmond Drive SE, Suite 103
Lacey, WA 98503

March 31, 2000

RE: Comments on Tacoma Water Habitat Conservation Plan, Incidental Take Permit, and Implementing Agreement

Dear Messrs. Romanski and Grady;

I'm writing to provide comments on the Tacoma Water habitat conservation plan (HCP), draft environmental impact statement (DEIS) for the incidental take permit (ITP), and implementation agreement (IA). The proposed HCP and ITP apply to forest management activities on approximately 14,888 acres of City of Tacoma Water Division lands in King county and activities relating to diversion of water from the Green River, and propose to exempt from ESA "take" provisions the 32 species of fish and wildlife: chinook, coho, sockeye, chum, and pink salmon; steelhead, coastal cutthroat, and bull trout; Pacific lamprey, river lamprey, and dolly varden; sailed, Cascades, and Oregon spotted frog; Cascade torrent, Van Dyke's and Larch Mountain salamander; northwestern pond turtle; bald eagle; northern goshawk; peregrine falcon; marbled murrelet; common loon; northern spotted owl; Vaux's swift; pileated woodpecker; olive-sided flycatcher; Townsend's big-eared bat; grizzly bear; Canada lynx; American marten; Pacific fisher; California wolverine; and gray wolf.

1 I object to issuance of an incidental take permit for the proposed management of the upper watershed by the US Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) for the ten federally listed threatened and endangered species, two federal candidates for listing, twelve federal species of concern, and eight other unlisted species. The HCP fails to meet the most basic requirements of the Endangered Species Act (ESA), 16 USC §§ 1531-1534, and for this reason alone, the permit request must be denied. The proposed management of the upper watershed pertains to no timber harvest only for the improvement of fish and wildlife habitat, but in fact will lead to further degradation of this already impaired forest ecosystem.

1. Aquatic Habitat

Riparian forests provide important habitat for Washington's wildlife. About eighty-five percent of Washington's terrestrial vertebrate species use riparian areas for nesting, feeding, roosting, mating, dispersal, and other life history functions (Thomas and others 1979, Brown 1985). Canning and Stevens (1989) estimate that between thirty-three and fifty percent of riparian areas

(1)

2 of Washington have been lost. Most of the habitat loss has occurred in the biologically productive lowlands of Washington where about seventy percent of riparian areas have been converted to other uses. These authors also estimate that roughly 2,000 acres of riparian habitat is lost each year.

Tacoma Water HCP's Forest Management Zones fall short of protecting critical riparian areas. The Natural Zone begins to protect the Green River main stem, lakes and major tributary streams with its 200 foot no-logging buffer zone, but leaves a large opening for logging within the buffer
3 zone with its allowance of "selective removal of danger trees within 150 feet of roads and harvest activities specifically conducted to improve habitat for one or more fish or wildlife species." If the wildlife species chosen is deer or elk, harvest could be conducted freely to create openings for grazing opportunities. Along much of this already heavily impacted river corridor runs a roadway, railroad and power line right-of-way, which decrease the effective width of the Natural Zone, and allows logging within the 200 foot buffer and possibly directly adjacent to the river.

Tacoma Water's logging prescriptions for riparian areas are inconsistent with available scientific
4 information and, if implemented, will likely result in adverse impacts and jeopardy of listed species. Over the last decade, several scientific studies identified management guidelines to provide functional riparian forests (see e.g. Pollock and Kennard 1998, USDA et al. 1993, WDFW 1997, NMFS 1998, WDNR 1997). Functional riparian areas are those which provide large and small woody material and litter inputs, shade, microclimatic conditions and protection from windfall.

The forest management proposed in the Tacoma Water HCP fails to provide for a functional riparian area. Within the "Conservation Zone", uneven aged logging is allowed, where "a
5 minimum of 50 healthy dominant (or snags) or co-dominant conifers per acre (where available)" will be left. This amounts to one tree per 871 square feet, which could hardly be termed a density which would assist in "accelerating and/or enhancing the development of late-seral forest conditions", as claimed by the HCP. Logging within the "Conservation Zone" would allow new road construction, and does not restrict roads from entering stream buffers. This zone will also be specifically "manipulated to attract deer and elk away from areas near the water supply" (DEIS p.3-6), i.e. logging is permitted to create open grazing habitat, detrimental to listed and unlisted species.

The HCP provides for minimal protection of riparian areas along Type 3, 4 and 5 streams, but
6 little or no protection of riparian areas within thinning operations. In addition, the "Commercial Zone", where intensive logging and roading is proposed, is located in the Green River headwater streams, and adjacent to the power line corridor, which provides little or no habitat values and little or no quality buffer between the logging areas and the Green River main stem. This, despite studies that suggest that up to half of the large woody material in lower gradient fish-bearing streams originates in upstream sources (see e.g. McDade et al. 1990).

One of the primary reasons for retaining trees along streams and landslide prone slopes is to
7 recruit large woody debris in stream channels and to restore stream structures for fish and other aquatic species. Such large woody debris has been greatly reduced in most streams in the region, due to past and recent logging practices. The HCP directly undermines the development of large woody debris and the HCP's associated riparian and aquatic conservation goals by allowing logging of selective trees within 150 feet of any roads, and as roads exist along the full length of the Green River, this could greatly impact the riparian buffer zone.

(2)

HCP prescriptions for Type 3, 4, and 5 streams allow for significant and detrimental changes to shade and microclimatic conditions provided by riparian forests. Studies conducted by Beschta
8 and Taylor (1988), and Holtby (1988) suggest that clearing riparian forests on non-fish bearing streams, as proposed under the HCP, will likely affect stream temperatures throughout the watershed. Brosofske et al. (1997), who studied buffer width on streams in western Washington, found that 100% of natural shade levels were not reached until about 250 feet from the stream. The little protection that streams receive under the Tacoma Water HCP will likely result in adverse affects for bull trout, cutthroat trout, amphibians, and other species dependent on cooler environments.

Table 1. Management of Riparian Areas.

Draft Tacoma Water Green River Water Supply Operations and Watershed Protection HCP (Preferred Alternative – B)	*Perennial Fish Bearing Streams:* Stream Types 1 & 2: 200 ft. buffer, no commercial logging. 0 ft. buffer in partial harvest areas. (Natural Zone surrounds much of Types 1 & 2). Type 3: 150 ft. buffer, no commercial logging. 50 ft. buffer for partial harvest (thinning) areas. *Perennial NonFish:* Type 4: 50 to 100 ft. buffer, no harvest. No protection in partial harvest (thinning) areas. *Intermittent:* Type 4: See Perennial NonFish. Type 5: 25 ft. buffer, no harvest.
NMFS "No Take"	*Perennial Fish Bearing Streams:* 340 ft. buffer, no logging. *Perennial NonFish:* 170 ft. buffer; no logging. *Intermittent Streams:* 100 ft. buffer, no logging.
Pollock et al (1998)	*Perennial Fish Bearing Streams:* 250 ft. buffer, no logging. *Perennial NonFish:* 250 ft. buffer, no logging. *Intermittent Streams:* 105 to 250 ft. buffer, no logging.
NW Forest Plan	*Perennial Fish Bearing Streams:* minimum 300 ft. buffer, no commercial logging. *Perennial NonFish:* minimum 150 ft. buffer, no commercial logging. *Ponds and Wetlands > 1 ac:* minimum 150 ft. buffer, no commercial logging. *Lakes and Ponds:* minimum 150 ft. buffer, no commercial logging. *Intermittent Streams and Wetlands < 1 ac.:* minimum 100 ft. buffer, no commercial logging.

Note: Summary focuses on riparian area widths and prescriptions, it does not include all the activities considered in riparian areas.

Stream buffer protections should at minimum be based on federal standards.

2. Monitoring protocol
10 Although the HCP outlines a detailed and thorough monitoring plan, the proposal that the City of Tacoma would be doing its own monitoring is cause for concern. The monitoring should be completed by an independent, impartial entity.

3. Take is premature
NMFS does not have the authority to issue ITPs for chinook, chum, coho, sockeye, and pink salmon, and cutthroat and steelhead trout because:
1) these threatened and as-yet-unlisted salmon and trout are not covered under 50 CFR 227.21(b);
2) ITPs have not been authorized by ESA section 4(d) rules; and
3) the Federal Register notice for NMFS' rules governing ITPs and HCPs states, in effect, that "take" permits are not generically authorized for threatened salmon species, and that
11 ESA 4(d) rules must be written to provide such authority (see Federal Register 55:97, May 18, 1990).

(3)

To date, such rules have not been finalized. Moreover, the draft 4(d) rules which are being contemplated for West Coast salmonids and cutaneous trout are highly inadequate, and should not be approved as currently drafted. We can provide more detailed analyses of these rules if so desired.

4. Term of the HCP
The 50 year term of the HCP with "No Surprises" provisions is extensive given the uncertainties engendered by climate change, the effectiveness of salmon conservation strategies and future
12 cumulative effects just to name a few. (In fact the HCP will significantly contribute to the cumulative effects on the imperiled species.) While we acknowledge the need for flexibility in the implementation of the ESA, providing "No Surprises" assurances for 50 years to a city entrusted in part with the conservation of at least 32 species flies in the face of societal responsibility.

Thank you for the opportunity to comment on the Tacoma Water HCP, DEIS, and ITP. Please incorporate into the administrative record all literature and other materials cited above. Our
13 ability to comment effectively on the Tacoma Water HCP, DEIS and IA is extremely limited due to the short comment period, concurrency of other deadlines and the scope of the HCP. We therefore recommend that future HCPs of this magnitude allow for at least a 90 comment period.

Sincerely,

Tanja Wilcox

(4)

Cheryl Miller
3303 North 36th Street Tacoma WA 98407 253/759-0680

March 30, 2000

Tim Romanski
US Fish and Wildlife Service
510 Desmond Drive, SE #102
Lacey, WA 98501

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
APR 05 2000
LACEY, WA
RECEIVED

RE: Draft HCP

Dear Mr. Romanski,

1 Section 4.2.3 of the Draft Implementing Agreement with the Services, refers to yield for water supply. It is unclear in the Agreement what water supply is being talked about. Current, proposed, does it cover all the water Tacoma is looking at selling over the next 100 years, the "operation life" of the Pipeline 5 and Howard Hanson Projects? It appears that the existing language covers all of the above and that protection of the existing contracts and the sales of future water to others also qualify. I cannot support this idea. This section should be specific to only the contracts and certificated water rights that are in existence as of the date of the signing of the Agreement, and should not cover speculative or contracts currently in negotiations.

2 Given the existing minimum instream flow agreement with the Muckleshoot Tribe and the court mandated instream flows, how will this HCP address the adequacy of these flows to meet the goals of the salmon recovery activities when and if the Proposed Second Supply Project Agreement is signed?

3 Since the life of this agreement is for 50 years, where is the contingency for less water due to the widespread warming in the Pacific Northwest and the subsequent decrease in snowfall at the lower elevations, the Green River watershed is not at high mountain elevations, that comes with the warming? Climatic warming is no more speculative than some of the other assumptions in the HCP. The only difference is that those other assumptions are being taken as truths rather than assumptions.

4 The HCP contains a fatal flaw. That flaw is with the ability to achieve the biological objectives through the adaptive management identified.

5 Section 10.1 of the implementing agreement states in part "The City will implement the adaptive management provisions in Section 6 of the HCP, when changes in management practices are necessary to achieve the HCP's biological objectives..."

Section 6 of the HCP states in part

"Monitoring is required to ensure measures are implemented according to specified standards." Page 6-1

"Measures must...ensure the results conform to expectations." Page 6-1

"Monitoring and evaluation...provides the Services the certainty that the measures achieve the anticipated level of impact minimization and mitigation required under Section 10 of the "ESA. Page 6-1

"Effectiveness monitoring measures are used to evaluate whether conservation measures have achieved the specified resource objective." Page 6-2

"Effectiveness monitoring for this HCP includes only those management activities ... over which Tacoma has complete control." Page 6-2

"Criteria for effectiveness monitoring measure included as part of this HCP will be developed in coordination with the Services." Page 6-4

6 So what the HCP is saying is that Tacoma is only looking at the management activities it has total control over, and that the HCP, and therefore the meeting of the biological objectives and the criteria for how effective the HCP is, those yet to be established by the Services under Section 10 of ESA, only applies to what Tacoma can manage.

7 Section 4.2.3 of the implementing agreement states in part that

"Nothing in this agreement shall be construed to give the Services the authority to impose or seek to impose measures additional to those specified in the HCP or this agreement that would...cause a reduction in yield for water supply."

As stated before, water supply is not defined in the agreement, so we can assume it means any water supply, public or private, for consumptive or non consumptive use.

8 So only if Tacoma has total control over the water withdrawal in its second supply (pipe 5) proposal does the water withdrawal come under the scrutiny of the HCP and its "effectiveness monitoring" for meeting the biological objectives of the ESA.

9 This is not acceptable. Tacoma does not have total control over the pipe 5 proposal under the proposed 5 party agreement. Tacoma would have only 3 of nine votes on the Project Committee. (Section 8.2 of the January 2000, Second Supply Project Agreement Between Tacoma, Seattle, Covington, Kent and Lakehaven).

10 Given the language currently in the HCP, any time Tacoma wanted to skirt out from under the requirements of the HCP all it would have to do is relinquish total control of a portion of any project. And any project related to pipe 5 would be automatically exempt from scrutiny.

11 Returning the Green River back from the brink of sterility, requires a commitment to adequate water flows in the River. For the HCP and the Services to not include a commitment to adequate flows in the River shows how hollow the commitment is to ESA in this document.

12 There should be two HCP's. One for the Green if the Proposed Agreement for the Second Supply Project is signed and one if it is not. The difference being, who has management control over Tacoma's water diversions from the Green and who has control over the implementation of the habitat enhancements necessary to increase fish and wildlife supplies.

13 The HCP needs to provide a way for the repair and fixing of one of the species that lives in the River. This HCP proposes, underneath all the fluffy language, keeping the status quo for river flows. The status quo being we can take what we want and the fish don't count. It is the status quo that is a great part of what created the situation in the first place. All the addition of woody debris to the river banks and carting of the fish overland to above the dams won't mean anything if the fish have no water to get to the debris and the truck station.

14 The agreement needs fixing and the HCP must be much stronger.

Thank you,

Cheryl Miller

Cheryl Miller

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE

APR 05 2000

LACEY, WA
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3-30-2000

Dear Mr. Romanski,

1 the Habitat Conservation Plan that the City of Tacoma is working on for its lands in the Green River Watershed needs necessary improvements. The

2 U.S.F.W.S. should do its utmost to protect salmon, wildlife, forests, river flows and recreational use of the Green river.

3 Two dams block salmon from miles of spawning habitat, Tacoma logs its lands and diverts a large amount of water into a

4 pipe to Tacoma, with a large amount of that used to water lawns. This will be increased if they construct an intertie with water districts in King County.

5 Tacoma must meet a higher standard to receive the permit.

(2) 3-30-2000

Changes needed include:

6 Preserve and restore spawning and protective shore habitat in the lower Green river.

7 Build fish ladders to provide a way for salmon and steelhead to access the waters above the dams.

8 Leave more water in the river below the dams for the salmon and water quality.

9 Don't enlarge the reservoir because it would decrease the area for wildlife habitat.

10 Water conservation must be the first way to provide municipal water supply, not more water diversions.

11 There shouldn't be any more logging on Tacoma's land, because these forests are needed

(3) 3-30-2000

11 for fish, wildlife habitat and clean water.

Thank you

Wm Quigley
29844-45th Pl S.
Auburn, Wa 98001

Dear Mr Komanski

1 Please do your utmost to preserve the Green River watershed.

2 Little water should be taken from it because that hurts the salmon.

3 Please do the right thing for salmon & future generations.

Thank you

Renee & Rod Such

Date: 03/31/2000 1:47 PM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:Green River HCP Comments

Author: Tim Romanski at 1PO-OLES
Date: 03/31/2000 1:47:16 PM
Priority: Normal
To: Jon Hale
Subject: Fwd:Green River HCP Comments

Forwarded w/Changes

Author: "angela silva" <ajosilva@hotmail.com> at FWS 03/31/2000 11:59:59 AM
To: tim_romanski@fws.gov at FWS
cc: CCRaines@aol.com at FWS
Subject: Green River HCP Comments

Forward Header

Subject: Green River HCP Comments
Author: "angela silva" <ajosilva@hotmail.com>
Date: 03/31/2000 11:59 AM

Mr. Romanski:

1 It is unfortunate that we live in a time where we have to forcefully encourage federal and state agencies/governments to adopt strong land use planning and species protection laws--protecting the planet, the habitat for us and all life, should always be the highest priority.

2 I realize that there are many factors/issues involved when making environmentally friendly decisions and that the Fish and Wildlife Service is in the midst of such a decision: the Green River Habitat Conservation Plan.

3 I urge you to require Tacoma do everything possible to protect salmon, wildlife, forests, rivers and river flows, and recreational uses of the

4 Green River. Full recovery of endangered species must be the standard--the bare minimum rather than the unattainable goal.

5 Tacoma must insist on more water conservation and provide adequate instream flows for salmon. Two dams are already blocking salmon from

6 miles of spawning habitat.

7 I am not a radical citizen, I am a romantic--I love the Earth and I realize more must be done to protect it and all its creatures.

8 I urge you to do everything in your power to NOT issue Tacoma a 50 year permit saying they are in compliance with the Endangered Species Act. More can be and should be done!

Thank you

Sincerely,

Angela J. Silva
Tacoma Native

Get Your Private, Free Email at http://www.hotmail.com

Date: 03/31/2000 10:00 AM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:GREEN RIVER HCP - Forests, Fish and Flows

Author: Tim Romanski at 1PO-OLES
Date: 03/31/2000 10:00:50 AM
Priority: Normal
To: Jon Hale
Subject: Fwd:GREEN RIVER HCP - Forests, Fish and Flows

---------- Forwarded w/Changes ----------

Author: ballehal@mindspring.com at FWS 03/31/2000 8:52:04 AM
To: <tim_romanski@fws.gov> at FWS
Subject: GREEN RIVER HCP - Forests, Fish and Flows

Forward Header

Subject: GREEN RIVER HCP - Forests, Fish and Flows
Author: ballehal@mindspring.com
Date: 03/31/2000 8:52 AM

Dear Mr. Romanski:

1 As you know, many salmon species in the Pacific Northwest are in great danger of extinction, and we support efforts to ensure they have the greatest chance of survival. In regards to the Green River HCP conducted by Tacoma Public Utilities, we believe steps must be taken on the part of USFWS to force TPU to

2 make up for serious shortfalls in this proposal. In short, we currently do not believe that the ESA is being followed with the HCP as it exists.

Here are some of our recommendations to help protect salmon and other wildlife to improve the HCP currently proposed:

3 Shrinking of salmon habitat must be reversed. Please preserve and restore spawning and protective shore habitat in the lower Green River, and provide a fish

4 ladder to get salmon and steelhead above the dams where possible (which many believe is possible despite dam size).

5 Please leave more water in the river (instream flows) below the dam for salmon and for improved water quality (more water keeps it colder and

6 cleaner), as well as for recreational uses such as boating.

7 Please do not enlarge the reservoir; it would eliminate important wildlife habitat.

8 Water conservation must be the first way to get municipal water supply, not more water diversions. Watering restrictions (especially

during summer months)
are needed!

Let's stop logging on City's land; these trees and forests
9 are needed for
fish and
wildlife habitat and for clean water. We'd like to see old
10 logging roads
removed, too.

We encourage you to purchase and protect lands in Rock
Creek and Sawmill
11 Creek. This would provide added protection to murrelets,
spotted owls and other
species, and offset impacts of the forest lost to the existing
reservoir.

Thanks for your time and consideration. If you have questions
or need
additional comments, please do not hesitate to contact us.

Paul and Donna Balle
28631 NE 63rd Way
Carnation, WA 98014
425.880.6066

Lloyd P. Fetterly
3015 - 39th St. Ct. NW
Gig Harbor, WA 98335

FISH & WILDLIFE SERVICE
WA OFFICE
MAR 15 2000
LACEY, WA
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March 13, 2000

Mr. Tim Romanski
Project Biologist
U.S. Fish and Wildlife Service
510 Desmond Dr. SE, Ste 102
Lacey, WA 98503-1273

Re: Proposed Habitat Conservation Plan, HCP, Tacoma Water Division, Tacoma Public Utility, City of Tacoma, Washington

Dear Mr. Romanski:

1 Enclosed are my comments with regard to the proposed Habitat Conservation Plan (HCP) and the administration of the Green River Watershed acreage of the Tacoma Public Utility. I am a Pierce County, Washington, resident.

2 Background. The City of Tacoma, Tacoma Public Utility, and its Water Division, owns 15,000 acres, or about ten (10) percent of the Green River Watershed in southeastern King County. The Tacoma Public Utility owns and operates hydroelectric facilities on the Green River. The reservoir of the Utility eliminated important fish habitat and drowned significant upland forests and wildlife habitat. The Utility has closed off a portion of the watershed to public access and use.

3 End Logging in the Utility Acreage. Commercial logging should be ended by the Tacoma Public Utility immediately within the acreage of the watershed that is owned by the Utility.
4 Commercial logging revenues are overshadowed by heavy environmental damage to the watershed involved. Unfortunately, commercial logging is taking place in approximately one-
5 third of the acreage of the Tacoma Public Utility within the Green River Watershed. Most ratepayers would rather have a responsibly maintained watershed, than a small revenue source from commercial logging that creates and continues to create havoc with the environmental values of the watershed.

6 Road Removals. Road removals should take place wherever possible within the acreage of the Utility. Unnecessary roads cause wildlife habitat fragmentation, as well as trespasses,
7 illegal poaching, and increase fire risks. Unnecessary roads increase wash-outs and the deposit of sediments in streams and rivers within the watershed. In the area of the Endangered Species Act
8 requirements of detailed plans for salmon recovery in western Washington, it is reasonable to
9 include the decommissioning of unnecessary roads within the plans of the Utility. Reductions in
10 road miles will also reduce maintenance costs to the Utility and to the Utility ratepayers. Also,
11 reductions and elimination of logging will reduce the need for certain road corridors within the acreage of the Tacoma Public Utility.

12 Land Purchases. The purchase of additional lands by the Tacoma Public Utility is strongly urged as a mitigation measure. One example is the Plum Creek Company lands on Sawmill Creek within the watershed.

13 Conclusion. The City of Tacoma's Tacoma Public Utility should undertake major restoration of fish and wildlife habitat within the Green River Watershed. The Tacoma Public Utility should purchase lands for ancient forests, should retire unneeded roads, and should end commercial logging at once.

Thank you for your consideration of these matters.

Sincerely yours,

LLOYD P. FETTERLY
(253) 857-9245 (home)
(253) 798-6730 (work)
(253) 798-6713 (fax)
(253) 381-4412 (cellular)
lfetter@co.pierce.wa.us

tpu0701.lpf

Date: 04/03/2000 7:24 AM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:Green River HCP comments

Author: Tim Romanski at 1PO-OLES
Date: 04/03/2000 7:24:46 AM
Priority: Normal
To: Jon Hale
Subject: Fwd:Green River HCP comments

Forwarded w/Changes

Author: Daniel Rosner <rosner@scn.org> at FWS 03/31/2000 7:01:12 PM
To: tim_romanski@fws.gov at FWS
Subject: Green River HCP comments

Forward Header

Subject: Green River HCP comments
Author: Daniel Rosner <rosner@scn.org>
Date: 03/31/2000 7:01 PM

1 The Tacoma Habitat Conservation Plan for its lands and operations in the Green River Watershed must be improved.

2 USFWS should require Tacoma to do everything possible to protect salmon, wildlife, forests, river flows, and recreational uses of the Green River.

3 Full recovery of endangered species should be the goal of this plan.

4 The current proposed HCP would allow Tacoma to log its lands and divert huge quantities of water to irrigate lawns in the greater Seattle area. All this would harm endangerd species and inhibit recovery efforts.

5 Times are changing. Tacoma must meet a higher standard to receive the proposed permit from the FWS.

6 Tacoma should be required to do what Seattle has done - end commercial logging on their lands in the watershed. Tacoma owns 15,000 acres, about 10% of the Green River watershed. To pay for restoration efforts by destroying habitat is shortsighted and unnecessary. The end-users of the water should pay the full cost.

7 Most people I've talked with are willing to pay a little more for their water once they understood the true cost of cheap water without adequate habitat restoration measures.

8 More water conservation is needed. Tacoma should also provide adequate instream flows for salmon.

The Tacoma HCP should clearly outline action plans for achieving the following outcomes:

9 * How it will restore a healthy watershed over the next 50 years.

10 * How is will improve spawning and protective shore habitat in the lower Green River.

11 * How is will get a fish ladder to get salmon and steelhead above the Tacoma Power dams.

12 * How it will leave more water in the river below the dams for salmon and water quality.

13 * How Tacoma can achieve its water needs without enlarging any reservoir.

14 * How water conservation will be the first way to get Tacoma's municipal water supply, not more water diversions.

15 * When Tacoma will end logging on the City's land - these forests are needed for fish and wildlife habitat and clean water.

16 I'll say it again - Times are changing! Tacoma must meet a higher standard in its HCP to recieve the 50 year permit. I live in Tacoma and am willing to help pay the small amount necessary to ensure a healthy watershed and environment for my children.

Sincerely,

Dan Rosner
2802 North Puget Sound Ave.
Tacoma, WA 98407
rosner@scn.org

Dear Staff People:

We must do everything possible
to protect salmon, wildlife, forests
1 river flows, and recreational uses on
Green River. Tacoma must be re-
quired to meet higher standards!

2 1— Leave more water in river
3 2— Preserve & restore more shore habitat.
4 3— Do not enlarge reservoir!
5 4— Encourage water conservation
6 5— No more logging on city lands!

Thank you for hearing & heeding. [illegible]

Roger A. Lowe, PE
13417, 133rd Ave. NE
Kirkland, WA 98034-5542
Voice (425) 820-7454
FAX (425) 820-6282 FAX
email rlowepe@main.net

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
APR 12 2000
LACEY, WA
RECEIVED

April 6, 2000

Mr. Tim Romanski
U.S. Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

Re: 1. Draft Tacoma Water Habitat Conservation Plan DHCP) (December 1999);
2. US Fish & Wildlife Service & National Marine Fisheries Service Draft Environmental Impact Statement (DEIS) for the Proposed Issuance of a Multiple Species Incidental Take Permit for the Tacoma Water Habitat Conservation Plan, Green River Water Supply Operations, and Watershed Protection; and
3. Implementing Agreement for the Tacoma Water Division, Tacoma Public Utilities Habitat Conservation Plan for the Green River, (King County) Washington, Municipal Water Supply

Dear Mr. Romanski:

1 This letter contains my comments as a member of the recreational boating community, as current President of Paddle Trails Canoe Club, and as a student of fisheries and environmental issues. It represents my personal opinion, and has not been reviewed or approved by the Club.

2 Paddle Trails Canoe Club was founded in 1970 and consists of about 200 members in Western Washington. We have used the Green River for training and recreational boating for years. Like other outdoors people, many of our members are active environmentalists. We have helped clean up the Green River annually for over a dozen years.

3 My comments focus broadly around two key issues: Instream flows; and Placement of woody debris in the river.

INSTREAM FLOWS

4 The single biggest issue of the HCP is the amount of water in the river at all times of the year. No amount of mitigaton can make up for low instream flows that leave inadequate water for fish and recreation, concentrate pollutants and allow the shallower water to warm to levels inhospitable to fish. With wild salmonids in severe trouble in western Washington, the focus of this HCP and related documents MUST be on instream flows.

5 The combination of the current 113 cubic feet per second withdrawal of water for Tacoma's Municipal Water Supply, the proposed Second Water Supply Project's withdrawal of an additional 100 cubic feet per second (cfs) and Tacoma's plans (with the Corps of Engineers) to double the amount of water stored in the reservoir behind Howard Hanson dam, has a drastic effect. This total impact must be considered, not merely the additional impact of future plans.

6 Low instream flows have adverse effects on boaters. Taking more water out of the river for Tacoma's water supply and for additional water storage negatively impacts both fish and boaters.

7 Canoeists, kayakers, rafters, and other boaters can be found on all of the reaches of the river from their first access point below the Tacoma diversion dam to the mouth of the Duwamish River. The most affected are whitewater boaters who run the Green River Gorge. The suitability of this section of the river for boating depends on flow levels. The whitewater boaters require a substantial flow to make it safely over the rock ledges in the riverbed and between the boulders scattered in the river.

8 If an HCP is ultimately agreed upon, it should include additional mitigation for recreation losses, particularly losses for whitewater boating.

9 Doubling the amount of water storage means that flows will be less than what would naturally occur and that there will be low flows for a longer period of time. That means loss of "boater-days." "Boater days" inadequately addresses the seasonal differences in available "boater-days". Factors such as skill level, confidence, and the very real danger of hypothermia are effected by shifts in boater-days from one time of year to another. Any allocation for "boater days" must consider the need for suitable flows during the warmer days of the year. Boater days should not be concentrated in winter when many are unable to boat, the days are short, and cold weather increases the problems of hypothermia. The concept of "boater days" should be explored to provide data on how changes in flow affects boaters on any given day. Then they should be allocated based on flow regimes so that differing skill levels may continue to take advantage of river recreation at appropriate times of the year.

10 By doubling the storage of water behind the Howard Hanson Dam, whitewater boating opportunities could be gone much earlier in the Spring, relegating the Green River's availability to boaters to not much more than the Winter months. Boater days should not be concentrated in winter when many are unable to boat.

11 Tacoma should also mitigate for its impacts on Recreation by working with the Corps of Engineers to keep flows as high as possible throughout the year, with the possible exception of untoward events which would cause major flooding downstream.

LARGE WOOODY DEBRIS

12 Tacoma and the Corps of Engineers plan to add Large Woody Debris to the river to help create habitat for fish. According to the Corps of Engineers, much of the LWD will be put into the Green River shortly below the Tacoma dam and allowed to flow down the Green River as it might if the dams were not obstructing its course from forested lands to some downstream permanent or temporary resting place.

13 Woody debris in rivers is an extreme hazard to river recreationalists. The number of deaths in Washington state caused by LWD varies from year to year, but appears to be on the order of 3 or 4 people per year.

14 LWD sometimes has been deliberately placed on the outside bends of rivers where the current is strongest and the current will take objects toward the debris. Unfortunately, an inadvertent swimmer, a child in an inner tube, an inexperienced boater in trouble will also be swept into the bank on an outside bend. If Large Woody Debris is used there, people will be snagged on it and die.

15 I have talked with at least 20 fisheries biologists and reviewed at least 60 fisheries research papers that pertain to LWD. There is evidence that LWD alters stream morphology and can alter fish densities. However, none of these research efforts show that there is a benefit to fish survival, vigor or returns of salmonids. Some papers claim that LWD benefits fish, but they all fail to measure or show improvements in fish survival or returns.

I believe that in the past there was a substantial amount of wood, both large and small, in many of our rivers. No one has show that this was a benefit to fish.

16 There are many rivers in our state now, such as the Satsop and White rivers that have a great deal of wood in them, but do not have any better salmonid returns that rivers with little wood.

17 State policy changed in the 1970's to encourage leaving wood in rivers rather than removing it. The late 1970's also was the beginning of the most noticeable declines in salmonid abundance.

18 The Green River is the only river in the Puget Sound Basin with a relatively healthy run of Chinook Salmon. The existing regime should not be experimented with. It is an excessive and unnecessary risk to Chinook Salmon.

There should be no sacrifice of human life for an illusion that LWD will benefit fish.

19 Dumping logs into the river to create "natural" logjams is irresponsible, and ignores the legal and moral responsibilities of designers and governmental entities. It is foolish and should not be allowed.

Thank you for allowing me to comment on this project.

Roger A Lowe

Roger Lowe, P.E.

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
APR 24 2000
LACEY, WA
RECEIVED

Lawrence T. Malloy
3301 37th Pl South
Seattle WA 98144

March 18 2000

Mr Tim Romanski
U.S. Fish + Wildlife Service
510 Desmond Dr S.E #102
LACEY, WA 98503

Re: TACOMA HCP

Dear Mr Romanski

1 This letter is ~~to~~ regarding my concerns over the TACOMA HCP. TACOMA's plan does little to address Habitat for Wild Salmon in the 3 mile reach between the Howard Hansen DAM and the Water Diversion point. Habitat is the most critical component in maintaining healthy salmon runs in the Pacific N.W. TACOMA's Public Utility virtually ignores the 3 mile reach. Habitat acquisition, restoration, placement of gravel and woody debris, AND releasing of migrating in this habitat should be considered.

2 Additionally I have grave concern over the ~~trap~~ capture + haul of migrating salmon.

MOST IMPORTANTLY, The planned "Fish Elevator @ The HOWARD HANSEN DAM for out migrating Fish is a New system that has not been proven. Monitoring followed by an alternative if migration is limited should be included in the plan.

3 LASTLY, The Lower reaches of The Green/Duwam are a Major Bottleneck. TACOMA has considered little of this impact on made contributions to this section of habitat. Even Seattle Public Utility considered AND implemented modification @ The BALLARD Locks

Thank You for considering my comments

As Ever

Lawrence T. Malloy

US Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

Dear Mr. Romanski:

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS)

1 Please require the utmost effort by Tacoma to save wild chinook salmon runs on the Green River. I want you to ensure that Tacoma's HCP guarantees the restoration of these and other salmon and steelhead runs and other species as well.

2 The HCP should end logging on Tacoma's lands to help heal the watershed. Forests help fish by keeping fine sediments out of the rivers. Trees help provide slow, steady return flows to the river and streams after rain and snow. They shade the streams to keep the water cold, they provide habitat
3 for all potential threatened species. Tacoma should be required to buy additional lands to help restore the watershed.

4 The HCP should keep flows in the river as natural as possible, including natural high flows which are important to fish. A lot of water must be in the
5 river to lessen the effects of pollution & help keep the water cool for salmon.

6 The HCP must not allow additional water storage at the Corps of Engineers' dam. The juvenile salmon cannot find their way through the reservoir and need less water storage, not more. The two dams impact salmon by not permitting upstream passage at all. Tacoma should be required to build fish
7 ladders around them. Fish should not be trucked around them.

8 The HCP must require full restoration of the natural movement of gravel and sediment downstream which is now impaired by the dams. Spawning habitat
9 below and above the dams must be restored. Tacoma must also restore the large woody debris that occured naturally in the watershed.

10 The HCP must require that Conservation and Re-Use of water is the method for restoring the river.

11 The HCP must mitigate Recreational losses from Tacoma's use of the River.

yours truly
D. Bettelheim

4.0 Specific Comments and Responses

The following is a complete set of comment letters received for the Tacoma Water HCP DEIS. Each letter was placed into one of six categories to represent the author's professional affiliation, if any. Each category is identified by a short code as follows:

Independent - IND
Non-Governmental Organization - NGO
Tribal Representative - TRI
Federal Agency - FED
Municipal Agency - MUNI
State Agency - STA

In addition to a category code, each letter was also numbered. A list of all letters by category and number follows:

Letter Number	Number of Comments	Name[1]	Representing
IND-1	11	Carol Beers	Self
IND-2	11	Anita L. Rocha	Self
IND-3	11	Paul Russel	Self
IND-4	11	Ward J. and Lois Irwin	Self
IND-5	11	Sharon Rundal	Self
IND-6	11	Bill Wepy	Self
IND-7	11	Jacoba Johnson	Self
IND-8	11	Steve Robinson	Self
IND-9	11	Walt K. Ruiz	Self
IND-10	11	Marie Mills	Self
IND-11	11	Donald G. Bottles	Self
IND-12	11	James G. Montgomery, Carolyn Leaver	Self
IND-13	11	Edward Boulton	
IND-14	4	Cynthia Weeks and Don Johnston	Self
IND-15	5	Shirley E. Hyink	Self
IND-16	7	Judi Moccia-Sattler	Self
IND-17	4	Christina Rodriguez	Self
IND-18	7	James and Bernita Sorensen	Self

[1] Note: Some names may have been unintentionally misspelled due to misinterpretations of handwritten signatures.

Letter Number	Number of Comments	Name	Representing
IND-19	7	Keith Peterson	Self
IND-20	8	Shelly Baur	Self
IND-21	5	Cassandra Howe	Self
IND-22	6	Jill McGrath	Self
IND-23	5	Mr. and Mrs. J.C. Bigua	Self
IND-24	4	Julie Alaimo	Self
IND-25	5	William H. Weber	Self
IND-26	3	Robert Watter	Self
IND-27	3	Theodore Dodge	Self
IND-28	6	Dalice A. Snider	Self
IND-29	5	Thelma Gower	Self
IND-30	6	Danielle Startzel	Self
IND-31	11	Peter and Naomi Rimbos	Self
IND-32	9	Len Elliott	Self
IND-33	14	Harry Romberg	Self
IND-34	11	Mary Fries	Self
IND-35	9	Shari Gachet	Self
IND-36	10	Mark Lawler	Self
IND-37	6	Jeff Simons	Self
IND-38	12	Barbara Geyer Brock	Self
IND-39	13	Tanja Wilcox	Self
IND-40	14	Cheryl Miller	Self
IND-41	11	Wes Quigly	Self
IND-42	3	Renee and Rod Such	Self
IND-43	8	Angela J. Silva	Self
IND-44	11	Paul and Donna Balle	Self
IND-45	13	Lloyd P. Fetterly	Self
IND-46	16	Daniel Rosner	Self
IND-47	6	Dorothy Kimbrell	Self
IND-48	19	Roger A. Lowe, P.E.	Self
IND-49	3	Lawrence T. Molloy	Self
IND-50	11	Babbette Keennee	Self
NGO-1	12	John Beal	Green Duwamish Watershed Alliance
NGO-2	12	Patricia Sumption	Friends of the Green River
NGO-3	9	Joseph Madrano	Trout Unlimited[2]
NGO-4	12	Jim DiPesso	Rainier Audubon Society
NGO-5	17	Timothy P. Cullinan	National Audubon Society
NGO-6	4	David Adams	Tahoma Audubon Society
NGO-7	27	Kristie E. Carevich	Center for Environmental Law & Policy
NGO-8	39	Jasmine Minbashian	Pacific Crest Biodiversity Project
NGO-9	14	Eric Espenhorst	Friends of the Earth NW
NGO-10	90	Multiple authors	Cascade Chapter, Sierra Club
NGO-11	20	Edward Henderson and Roger Ternes	The Mountaineers

[2]Frank Urabeck, Trout Unlimited, telephoned Tacoma Water to request a forum to discuss large woody debris management in the Green River as it relates to Tacoma Water's HCP, 3 February 2000. Tacoma Water is working with interest groups such as Trout Unlimited regarding this request. No formal letter was received by Mr. Urabeck and, therefore, is not included in this FEIS.

Letter Number	Number of Comments	Name	Representing
TRI-1	23	Bruce Davies	NW Indian Fisheries Commission
TRI-2	116	Chantal Stevens	Muckleshoot Indian Tribe
FED-1	39	Richard B. Parkin	Environmental Protection Agency
FED-2	13	Mark T. Ziminske	U.S. Army Corps of Engineers
FED-3	5	Karen Bergeron	U.S. Forest Service
STA-1	161	David Whipple	Washington Dept. Fish & Wildlife
STA-2	94	Janet Thompson	Washington Dept. Ecology
STA-3	1	Rebecca Inman	Washington Dept. Ecology
MUNI-1	20	Ron Sims	King County Executive
MUNI-2	61	Randy M. Sandin	King County DDES
MUNI-3	4	Randy M. Sandin	King County DDES
MUNI-4	4	Tom Nelson	King County DNR

4.1 INDEPENDENT COMMENT LETTERS

Comment Responses to:
Independent-1 (IND 1)
Independent-2 (IND 2)
Independent-3 (IND 3)
Independent-4 (IND 4)
Independent-5 (IND 5)
Independent-6 (IND 6)
Independent-7 (IND 7)
Independent-8 (IND 8)
Independent-9 (IND 9)
Independent-10 (IND 10)
Independent-11 (IND 11)
Independent-12 (IND 12)
Independent-13 (IND 13)

IND 1-1 through IND 13-1
See General Comment Responses 3 and 23.

IND 1-2 through IND 13-2
See General Comment Response 7. The commenter is correct in implying that forests influence water quality and stream function in a number of ways. As suggested in the comment, forest vegetation can: 1) stabilize soil and filter surface flows to reduce the amount of fine sediment entering streams; 2) moderate the effects of storm events on stream flows; 3) provide shade that can reduce peak surface water temperatures; and 4) provide physical habitat (large woody debris) for fish and wildlife (HCP subsection 5.3.2). All of these functions were considered in the development of the HCP, and all are accounted for in the riparian and upland management measures identified in Chapter 5 of the HCP.

Streambank integrity, vegetative filtering of surface flows, shade, and large woody debris would be provided by maintaining no-harvest forest buffers along all streams on the Covered Lands. Buffers

will range from 25 feet wide on intermittent non-fish-bearing streams (DNR Type 5) to 200 feet wide on large fish-bearing streams (DNR Types 1 and 2). Streams within the Natural Zone would have even wider buffers. These buffers would meet or exceed the buffers prescribed by the recent Washington Forests and Fish Report, which represents the state of the art in commercial forestland management for fish and water quality.

IND 1-3 through IND 13-3

See General Comment Response 8.

IND 1-4 through IND 13-4

The Services and Tacoma Water agree that a flow regime that better mimics the natural flow regime of the Green River is desirable (see General Comment Response 27). Because it represents a small fraction of the highest flows in the Green River (less than 2%), Tacoma's withdrawal would not appreciably affect high flows in the Green River. Furthermore, because high flows generally also represent high turbidity events, Tacoma generally reduces or stops water withdrawal from the mainstem Green River during high flow events.

The primary factor influencing the flow regime in the Green River is operation of Howard Hanson Dam, which is the sole responsibility of the USACE, not Tacoma Water. As noted in General Comment Response 16, the primary vehicle for coordination and flow management adaptation in the future will be the Green River Flow Management Committee. Conservation measures and monitoring to be implemented by Tacoma Water under its HCP would facilitate development of a more natural flow regime if that is the target condition identified by the Green River Flow Management Committee.

IND 1-5 through IND 13-5

See General Comment Response 17. Although Tacoma Water withdraws a substantial portion of the Green River flow during the summer, the minimum flow requirements to be implemented by Tacoma under its HCP meet or exceed existing instream flow requirements set by Ecology (HCP subsections 5.1.1 and 5.1.2). During extreme, summer low-flow events, conservation measures in the HCP would increase the amount of water in the river compared to baseline conditions. However, Tacoma Water has limited ability to affect water temperature and pollutant concentrations in the middle and lower watershed.

IND 1-6 through IND 13-6

See General Comment Response 13.

IND 1-7 through IND 13-7

See General Comment Response 22.

IND 1-8 through IND 13-8

See General Comment Response 20. The purpose of an HCP is to minimize and mitigate the impacts of any incidental taking authorized by a Section 10 permit, and to ensure that issuance of the permit does not appreciably reduce the likelihood of the survival and recovery of the species in the wild. An HCP is not required to recover listed species or restore habitat damaged by past actions, although many HCPs, including Tacoma Water's, include measures specifically designed to rehabilitate habitat that is not currently considered to be functioning properly.

Interruption of gravel transport in the mainstem Green River has been primarily the result of construction and operation of Howard Hanson Dam by the USACE. Construction of the Tacoma Headworks in 1912 intercepted approximately 13,500 cubic yards of gravel, equivalent to less than a year's supply of bedload (U.S. Army Corps of Engineers 1998; Perkins 2000). In contrast, Howard Hanson Dam has intercepted virtually all of the bedload from the upper watershed for the past 37 years.

Moreover, Tacoma's proposed increase in the height of the Tacoma Headworks will not substantially influence the downstream transport of sediment. Raising the Headworks by 6.5 feet will result in approximately 43,000 cubic yards of increased sediment storage. Assuming that approximately 15 percent of the natural sediment load was bedload (Olympic National Park 1996), the structure would intercept approximately 6,500 cubic yards of gravel. The presence of Howard Hanson Dam upstream of the Tacoma Headworks currently prevents the downstream transport of gravel and larger-sized sediment. Consequently, the actual composition of intercepted materials is expected to be primarily fine sediments.

The volume of gravel-sized sediments that Tacoma Water proposes to add to the river will exceed the amount of material that would be intercepted by the raised Headworks. In addition, the increment of gravel placed by Tacoma under the HCP would be supplemented by gravel placed by

the USACE as part of the Section 7 consultation process and jointly by the USACE and King County as part of the Green-Duwamish General Investigation Project. Together, these projects are expected to restore downstream movement of gravel.

IND 1-9 through IND 13-9

See General Comment Response 18.

IND 1-10 through IND 13-10

See General Comment Response 4. Water conservation and reuse planning are integral components of Tacoma Water's efforts to protect and restore Green River aquatic resources. These methods alone are not sufficient to restore Green River instream resources, and therefore must be supplemented by other resource planning approaches.

IND 1-11 through IND 13-11

See General Comment Responses 19 and 21.

Comment Responses to Independent-14 (IND 14)

IND 14-1

Comment noted.

IND 14-2

See General Comment Response 7.

IND 14-3

See General Comment Responses 4, 16, 17, 19, and 21.

IND 14-4

See General Comment Response 22.

Comment Responses to Independent-15 (IND 15)

IND 15–1

Comment noted.

IND 15-2

See General Comment Responses 16, 17, 22, and 24.

IND 15-3

See General Comment Responses 4 and 12.

IND 15–4

See General Comment Response 7.

IND 15–5

As stated in General Comment Response 3, Tacoma Water is required to meet the issuance criteria for an ITP as outlined in Section 10(a)(2)(B) of the ESA. In meeting these mandatory elements of Section 10 of the ESA, the Services anticipate that habitats for fish and wildlife would be restored, maintained, and preserved over the 50-year term of the HCP.

As examples, under the HCP the number of acres of timber on Tacoma lands more than 106+ years old would increase from the current 312 acres to 3,971 acres over the term of the permit. Tacoma Water has also committed, under HCMs 3-01B and 3-02, to conduct no timber harvest on 5,545 acres of uplands and within riparian buffers. This represents approximately 37 percent of the City of Tacoma's entire ownership in the Upper Green River Watershed.

Comment Responses to Independent-16 (IND 16)

IND 16-1

See General Comment Response 22.

IND 16-2

See General Comment Responses 16, 17, and 27.

IND 16-3

See General Comment Response 12.

IND 16-4

See General Comment Response 4.

IND 16-5

See General Comment Response 7.

IND 16-6

See General Comment Responses 18 and 21.

IND 16-7

Comment noted.

Comment Responses to Independent-17 (IND 17)

IND 17-1

Comment noted.

IND 17-2

See General Comment Responses 16 and 24.

IND 17-3

See General Comment Responses 12, 13, 16, 17, and 22.

IND 17-4

See General Comment Response 7.

Comment Responses to Independent-18 (IND 18)

IND 18-1

Comment noted.

IND 18-2

See General Comment Responses 16 and 24.

IND 18-3

See General Comment Response 22.

IND 18-4

See General Comment Responses 12, 13, 16, 17, and 21.

IND 18-5

See General Comment Response 12.

IND 18-6

See General Comment Response 4.

IND 18-7

See General Comment Responses 7 and 10.

Comment Responses to Independent-19 (IND 19)

IND 19-1

Comment noted.

IND 19-2

See General Comment Response 24.

IND 19-3

See General Comment Response 17.

IND 19-4

See General Comment Responses 12 and 13.

IND 19-5

See General Comment Response 7.

IND 19-6

See General Comment Response 4.

IND 19-7

See General Comment Response 4.

Comment Responses to Independent-20 (IND 20)

IND 20-1

On the contrary, Tacoma Water, through the development of an HCP, recognized that its activities on the Green River and in the Green River Watershed have the potential to adversely impact listed and unlisted fish and wildlife species. Instead of ignoring its responsibilities under the ESA, Tacoma Water, with the assistance of the Services, developed an HCP that addressed the impacts of its water withdrawal activities and timber operations on listed and unlisted species in the Green River Watershed.

IND 20-2

See General Comment Response 4.

IND 20-3

The construction of Pipeline No. 5 is not a covered activity under the HCP. Any incidental take associated with the construction of Pipeline No. 5 will be addressed by a separate ESA Section 7 consultation with the USACE.

Impacts associated with the diversion of water into Pipeline No. 5 are addressed in the HCP. Mitigation for these impacts is described in HCP Chapter 5, subsection 5.1, and summarized in General Comment Response 17.

IND 20-4

See General Comment Responses 7 and 10.

IND 20-5

See General Comment Response 8.

IND 20-6

Congress amended Section 10 of the ESA in 1982 to provide the Services the ability to issue permits to non-federal entities authorizing the incidental take of listed species. This authorization can be permitted so long as the take is incidental to otherwise lawful activities, and if such activities are

conducted in accordance with an approved HCP. Additionally, the HCP must minimize and mitigate the impacts of the proposed take to the maximum extent practicable, and not appreciably reduce the likelihood of survival and recovery of the species in the wild.

Although the Services have not completed their final analyses of the effects of Tacoma's HCP, preliminary analyses suggest that the HCP would meet the standards required under Section 10 of the ESA. Therefore, the comment that take should not be allowed as part of this HCP appears to reflect a criticism of the mechanism created by Congress to authorize incidental take of listed species and the legal standards for such permits. The Services do not have the authority to make changes or amendments to the ESA, which Congress has authorized and, therefore, can only operate within the framework of the Act as amended by Congress.

IND 20-7

See General Comment Response 22.

IND 20-8

See General Comment Responses 4, 17, and 27.

Comment Responses to Independent-21 (IND 21)

IND 21-1

Comment noted.

IND 21-2

See General Comment Responses 7 and 8.

IND 21-3

See General Comment Response 4.

IND 21-4

See General Comment Responses 22 and 24.

IND 21-5

See General Comment Response 4.

Comment Responses to Independent-22 (IND 22)

IND 22-1

Comment noted.

IND 22-2

See General Comment Responses 3 and 7.

IND 22-3

See General Comment Responses 16, 20, and 21.

IND 22-4

See General Comment Response 4.

IND 22-5

Comment noted.

IND 22-6

See General Comment Responses 22, 24, 23, and 16.

Comment Responses to Independent-23 (IND 23)

IND 23-1

Comment noted.

IND 23-2

See General Comment Responses 3 and 7.

IND 23-3

See General Comment Responses 4, 23, and 24.

IND 23-4

The two projects the commenter refers to are unrelated. See Specific Comment Response IND 23-5, below.

IND 23-5

See General Comment Responses 7 and 8.

Comment Responses to Independent-24 (IND 24)

IND 24-1

See Specific Comment Response IND 20-6.

IND 24-2

See General Comment Response 4. Also see subsection 2.2 of the FEIS.

IND 24-3

See General Comment Response 12.

IND 24-4

See General Comment Responses 2 and 4.

Comment Responses to Independent-25 (IND 25)

IND 25-1

Comment noted.

IND 25-2

See General Comment Response 22.

IND 25-3

See General Comment Response 12.

IND 25-4

See General Comment Responses 7 and 8.

IND 25-5

See General Comment Response 4.

Comment Responses to Independent-26 (IND 26)

IND 26-1

Comment noted.

IND 26-2

See General Comment Responses 3, 7, and 8.

IND 26-3

See General Comment Responses 17 and 21.

Comment Responses to Independent-27 (IND 27)

IND 27-1

Comment noted.

IND 27 -2

See General Comment Response 28.

IND 27-3

See General Comment Response 31.

Comment Responses to Independent-28 (IND 28)

IND 28-1

Comment noted.

IND 28-2

See General Comment Response 7.

IND 28-3

The Services do not intend to make the Green River Watershed a "sacrifice" watershed. On the contrary, the Services have invested substantial effort into protecting and conserving resources on the Green River and in the Green River Watershed. The Services have worked with and continue to work with the USACE to address the effects of the Howard Hanson Dam on fish and wildlife resources, especially threatened and endangered species. The Services are also involved in the implementation of the Northwest Forest Plan on federal lands in the watershed and work with the USFS to ensure compliance of its activities with the ESA. In addition, the Services have negotiated two HCPs in the watershed and are now working with Plum Creek Timber Company and the DNR to implement those HCPs. In total, the Services have been effective in influencing the management of threatened and endangered species habitat on 81 percent of the acreage in the Upper Green River Watershed through Section 7 consultations and the development of three HCPs, including Tacoma's.

IND 28-4

See General Comment Response 17.

IND 28-5

See General Comment Responses 12 and 13.

IND 28-6

See General Comment Response 4.

Comment Responses to Independent-29 (IND 29)

IND 29-1

Comment noted.

IND 29-2

See General Comment Response 3.

IND 29-3

Refer to General Comment Responses 4, 16, 17, 24, 26, and 27.

IND 29-4

The use of a fish ladder to pass adult salmonids over Howard Hanson Dam has several critical limitations, but we believe the proposed trap-and-haul facility would be successful in restoring adult salmon and steelhead access to the Upper Green River Watershed (see General Comment Response 22). Providing the opportunity to restore self-sustaining runs of salmon to the upper Green River is an important part of Tacoma's HCP, but conservation measures to protect downstream habitats are also important. As described in General Comment Response 24, a variety of conservation measures have been developed to protect and restore Green River habitats downstream of Tacoma Water's Headworks.

IND 29-5

See Specific Comment Response IND 28-3.

Comment Responses to Independent-30 (IND 30)

IND 30-1
Comment noted.

IND 30-2
See General Comment Response 17 for a discussion of instream flows and providing additional protection for fish and other aquatic resources.

IND 30-3
See General Comment Responses 7, 8, and 11.

IND 30-4
See General Comment Response 22 for a discussion of the preferred method of restoring adult anadromous fish access to the Upper Green River Watershed.

IND 30-5
By committing to the Natural and Conservation Zones (HCM 3-01B and HCM 3-01C) and no-harvest riparian buffers (HCM 3-02A) in the HCP, Tacoma believes and the Services expect that the HCP would provide long-term habitat for wildlife. Under these three conservation measures, approximately 8,316 acres of Tacoma Water's 14,888 acres would be managed by either no-harvest or uneven-aged harvest regimes to maintain and create mature and late-seral forest conditions for fish and wildlife that depend on either older forest, mature riparian habitats, or both for their survival.

IND 30-6
Comment noted.

Comment Responses to Independent-31 (IND 31)

IND 31-1
Comment noted.

IND 31-2
See General Comment Response 7.

IND 31-3
See General Comment Response 12.

IND 31-4
See General Comment Response 8.

IND 31-5
Although Section 10(a)(2)(B) of the ESA is not necessarily intended to recover listed species, the Services do recognize that HCPs must be consistent with any federal recovery plans for listed species, and thus must allow for recovery of listed species to occur. In general, the Services believe that HCPs can provide an effective regulatory and management tool for the conservation of listed and unlisted species on non-federal lands.

IND 31-6
The effects of changes in Green River sediment movement on salmonid spawning habitats are described in HCP subsection 4.5.3.1, Processes Affecting Fish Habitat and Populations: Sediment Transport. Although interception of gravels behind Howard Hanson Dam is not the result of a Tacoma Water action, Tacoma is contributing to efforts designed to restore the movement of gravels in the Green River below Howard Hanson Dam (see HCM 2-09, Mainstem Gravel Nourishment).

IND 31-7
See General Comment Response 22 for a discussion of the preferred method of restoring adult anadromous fish access to the Upper Green River Watershed.

IND 31-8

See General Comment Response 27 for a discussion of flow management and natural flow variations.

IND 31-9

See General Comment Responses 4 and 29.

IND 31-10

Comment noted.

IND 31-11

Comment noted.

Comment Responses to Independent-32 (IND 32)

IND 32-1

See General Comment Responses 2 and 26.

IND 32-2

Under the authority of the ESA, the Services cannot demand that the City of Tacoma do whatever is necessary to protect salmon, wildlife, forest, and river flows. Tacoma, like other HCP Applicants, must meet the issuance criteria for ITPs in Section 10(a)(2)(B) of the ESA. Tacoma Water is required under the ESA to minimize and mitigate the impacts of its activities on federally listed species to the extent practicable, and to ensure that its activities do not appreciably reduce the likelihood of the survival and recovery of those species in the wild. For an additional description of these criteria, refer to General Comment Response 3.

IND 32-3

Comment noted.

IND 32-4

See General Comment Response 24.

IND 32-5

See General Comment Response 17 for a discussion of instream flows and providing additional protection for fish and other aquatic resources.

IND 32-6

See General Comment Responses 12 and 13 for a discussion of Tacoma Water and the storage of additional water behind Howard Hanson Dam.

IND 32-7

See General Comment Response 4.

IND 32-8

See General Comment Responses 7 and 8.

IND 32-9

See General Comment Response 3 for an explanation of the federal ESA-mandated criteria for issuing an ITP.

Comment Responses to Independent-33 (IND 33)

IND 33-1
Comment noted.

IND 33-2
Comment noted.

IND 33-3
The Services have invested substantial effort into protecting and conserving resources on the Green River and in the Green River Watershed. The Services have worked with and continue to work with the USACE to address the effects of the Howard Hanson Dam on fish and wildlife resources, especially threatened and endangered species. The Services are also involved in the implementation of the Northwest Forest Plan on federal lands in the watershed and work with the USFS to ensure compliance of their activities with the ESA. In addition, the Services have negotiated two HCPs in the watershed and are now working with Plum Creek Timber Company and the WDNR to implement those HCPs. In total, the Services have been effective in influencing the management of threatened and endangered species habitat on 81 percent of the acreage in the Upper Green River Watershed through Section 7 consultations and the development of three HCPs, including Tacoma's.

IND 33-4
As described in General Comment Response 24, a variety of conservation measures have been developed to protect and restore Green River habitats downstream of the Tacoma Headworks.

IND 33-5
See General Comment Responses 7 and 8.

IND 33-6
See General Comment Responses 11 and 28.

IND 33-7

See General Comment Response 12.

IND 33-8

See General Comment Response 17 for a discussion of instream flows and providing additional protection for fish and other aquatic resources. We have responded to the request for additional flows for recreation in General Comment Response 21.

IND 33-9

See General Comment Responses 12 and 13 for a discussion of Tacoma Water and the storage of additional water behind Howard Hanson Dam. General Comment Response 21 discusses instream flows and the protection of recreational opportunities. Increasing flows would provide limited water quality benefits (HCP subsection 7.1.3, Potential Effects of Conservation Measures on Chinook Juvenile Rearing), but was a consideration in development of conservation measures affecting instream flows (HCMs 1-01, 1-02, 2-02, and 2-06).

IND 33-10

See General Comment Response 22 for a discussion of the preferred method of restoring adult anadromous fish access to the Upper Green River Watershed.

Please note that under the USACE's Additional Water Storage Project, the height of Howard Hanson Dam would not be raised and the additional summer storage would not affect the selection of a fish ladder or trap-and-haul to pass adult salmon and steelhead into the upper watershed. Howard Hanson Dam currently provides 106,000 acre-feet of flood control storage. Without the Additional Water Storage Project, the summer conservation pool is about 30,400 acre-feet and represents about 29 percent of available storage; with the Additional Water Storage Project, the summer conservation pool would be increased to 50,400 acre-feet, but still would only represent about 48 percent of available storage. The summer conservation pool would be evacuated during the fall to provide for flood storage with or without the Additional Water Storage Project. The conservation pool fluctuations associated with flood control present a serious obstacle to the use of a fish ladder regardless of the effects of the Additional Water Storage Project.

IND 33-11

See General Comment Response 4.

IND 33-12

Comment noted.

IND 33-13

It is true that the overriding purpose of the ESA is to conserve the ecosystems upon which threatened and endangered species depend. With this in mind, when Congress amended Section 10 of ESA it was its intention that the HCP process and the issuance of ITPs would be used to reduce conflicts between listed species and economic development. To accomplish this the HCP process allows some individuals of a species to be harmed or taken under an ITP, if such take is incidental to otherwise lawful activities and does not appreciably reduce the chances of survival and recovery of listed species in the wild. See General Comment Response 3 for additional information.

IND 33-14

Comment noted.

Comment Responses to Independent-34 (IND 34)

IND 34-1
Comment noted.

IND 34-2
Comment noted.

IND 34-3
Comment noted.

IND 34-4
Comment noted.

IND 34-5
The City of Seattle Cedar River HCP was negotiated between the Services and the City of Seattle. The development of that plan ran parallel to Tacoma Water's HCP effort; the Seattle plan was not used as a model to develop Tacoma's plan.

IND 34-6
Comment noted.

IND 34-7
Comment noted.

IND 34-8
See General Comment Responses 7 and 11. The HCP provides a set of habitat conservation measures designed to protect Covered pecies and their habitats. Tacoma Water owns only about 10 percent (14,888 acres) of the Upper Green River Watershed, and will have relatively little influence on the snow pack. However, the HCP would protect hydrologically mature vegetation conditions in the Natural and Conservation Zones, which encompass approximately 52 percent (7,812 acres) of Tacoma Water's property in the upper watershed. Additional hydrologically mature vegetation would be provided in the Commercial Zone during the second half of each harvest rotation.

See General Comment Response 12. Raising the level of the reservoir behind Howard Hanson Dam would be a federal activity conducted by the USACE as part of the Additional Water Storage Project. As noted in the comment, the enlarged reservoir would inundate wildlife habitat. Mitigation for the loss of that habitat would be provided by the USACE and Tacoma Water on lands proposed for management under the HCP. The resulting habitat conditions on Tacoma Water lands were incorporated into the baseline conditions used in the analysis of the HCP, but the mitigation was not discussed in detail because it is not part of the HCP. Mitigation for the Additional Water Storage Project has been previously addressed as part of a federal Section 7 review.

See General Comment Response 6. The HCP would not alter Tacoma Water's ability to continue working cooperatively with other landowners in the Upper Green River Watershed to protect fish and wildlife habitat.

IND 34-9

While developing the Tacoma Water HCP, the management strategies provided in other parts of the Upper Green River Watershed by HCPs or other management efforts (e.g., the Northwest Forest Plan) were considered. The Tacoma Water HCP was designed to complement these other management efforts. The Cumulative Effects section of the DEIS (subsection 4.4.3) provides a brief summary of the management provided by these other management efforts (including HCPs) for each of the species covered under the ITP. The other HCPs and the Northwest Forest Plan all provide conservation measures for protecting salmon. Please see General Comment Response 7 concerning Tacoma's timber harvest activities.

IND 34-10

Comment noted.

IND 34-11

Comment noted.

Comment Responses to Independent-35 (IND 35)

IND 35-1
Comment noted.

IND 35-2
Comment noted.

IND 35-3
Comment noted.

IND 35-4
Comment noted.

IND 35-5
Refer to General Comment Responses 22 and 23.

IND 35-6
Commenter's concern noted. This is proposed in Habitat Conservation Measure: Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Measures (HCM 2-03), and is part of the USACE Additional Water Storage Project. By planting inundation-tolerant vegetation, adjacent to areas inundated by Howard Hanson Reservoir and along lower reaches of tributaries flowing into the reservoir, denuded shorelines would be re-vegetated with more water-tolerant plant communities for both fish and wildlife habitat and would lessen erosion from wave action. The HCP does not suggest which plant species would be used, only that they should be tolerant to inundation. The recommended plant species to be used would be determined during the USACE's final design of the Additional Water Storage Project with agreement by WDFW and Tacoma Water. Plant species native to western Washington are preferred.

IND 35-7
Comment noted.

IND 35-8

The Services must respond to all ITP applications. The Services do exercise discretion in evaluating the application, which includes the HCP, to determine whether the proposal will meet specific criteria called "issuance criteria." If the issuance criteria are met, the Services must issue the ITP. If the Services believe the issuance criteria will not be met by the Applicant's proposal, the Applicant may choose to modify or withdraw the proposal and ITP application. Refer to General Comment Response 3 for a description and explanation of these issuance criteria.

IND 35-9

Comment noted.

Comment Responses to Independent-36 (IND 36)

IND 36-1

See General Comment Responses 3 and 7.

IND 36-2

The Tacoma Water HCP would result in very little logging of mature forest. No commercial timber harvesting would occur in the Natural Zone (approximately 39% of the Covered Lands) and only stands less than 100 years old in the Conservation Zone (35% of the Covered Lands) would be commercially thinned to promote the development of late-seral forest conditions. Once a stand in the Conservation Zone reaches 100 years of age, there would be no further harvesting. In the Commercial Zone, harvesting would occur on a 70-year rotation. Only about 58 acres of the Commercial Zone support forest over 100 years of age that could be harvested under the HCP.

IND 36-3

See General Comment Responses 3 and 7, and Specific Comment Response NGO 5-5.

IND 36-4

None of Tacoma Water's lands in the upper watershed are within a federally designated Roadless Area. Tacoma Water owns some lands adjacent to Roadless Areas. These lands are located within Tacoma's Natural Zone, and would not be harvested.

IND 36-5

See General Comment Response 8.

IND 36-6

See General Comment Response 27 for a discussion of flow management and natural flow variations.

IND 36-7

See General Comment Response 4 regarding Tacoma's water conservation efforts, and General Comment Response 27 for a discussion of natural flow variations.

IND 36-8

The commenter urges the purchase of land for habitat protection along the lower Green River below Howard Hanson Dam. While Tacoma has focused some efforts below Howard Hanson Dam, such as the restoration of side channel habitat, land purchase for habitat protection has always been emphasized in the upper watershed above Tacoma's intake. Tacoma anticipates continuing its land purchase emphasis in this area, but also acknowledges the extensive efforts of King County and others to protect and restore habitat in the lower Green River through currently ongoing watershed restoration efforts with the USACE.

IND 36-9

The Tacoma Water lands in the Upper Green River Watershed are closed to public access to protect water quality, much the same as the City of Seattle lands in the upper Cedar River Watershed. In addition to protecting water quality, public access restrictions also provide benefits to the Covered Species by minimizing human activity near denning, nesting, and foraging sites on the Covered Lands. The Services consider it neither prudent nor necessary to require public access to the Covered Lands as mitigation for impacts under the ITP.

IND 36-10

Comment noted.

Comment Responses to Independent-37 (IND 37)

IND 37-1

Comment noted.

IND 37-2

See General Comment Response 4.

IND 37-3

Table 2-2 in the DEIS (Tacoma Water's customer base as of 1998) illustrates total water consumption in million gallons for 1998 by four Customer Types: Residential, Commercial/Industrial, Government, and Wholesale. The column entitled "Water Use (million gallons per day) is incorrectly labeled. It should be labeled "Water Use (million gallons)."

IND 37-4

See General Comment Response 13.

IND 37-5

The Services believe that it would be rare for unforeseen circumstances to result in a jeopardy situation. However, in such an event, the Services would use all of their authorities and resources, would work with other federal agencies to rectify the situation, and would work with Tacoma Water to redirect conservation and mitigation measures to remove the jeopardizing effects. The Services have significant resources and authorities that can be utilized to provide additional protection for threatened and endangered species that are the subject of a given HCP, including land acquisition or exchange, habitat restoration or enhancement, translocation, and other management techniques. In the event that the species continues to decline in light of these preventative measures, the Services retain the right to revoke a permit in the face of jeopardy.

IND 37-6

See General Comment Responses 7, 8, and 5.

Comment Responses to Independent-38 (IND 38)

IND 38-1
Comment noted.

IND 38-2
Comment noted.

IND 38-3
See General Comment Responses 7 and 8.

IND 38-4
See General Comment Response 10.

IND 38-5
Commenter's concern noted. This is proposed in HCM 2-03, and is part of the USACE Additional Water Storage Project. By planting inundation-tolerant vegetation, adjacent to areas inundated by Howard Hanson Reservoir and along lower reaches of tributaries flowing into the reservoir, denuded shorelines will be re-vegetated with more water-tolerant plant communities for both fish and wildlife habitat, which will lessen erosion from wave action. The HCP does not suggest which plant species will be used, only that they should be tolerant to inundation. The recommended plant species to be used will be determined during the USACE's final design of the Additional Water Storage Project with agreement by WDFW and Tacoma Water. Plant species native to western Washington are preferred.

IND 38-6
In order for Tacoma Water to maintain its status of an unfiltered surface water supply under the Washington State Board of Health Drinking Water Regulations (Chapter 246-290 WAC), it must control access into the Upper Green River Watershed. Approximately 23 miles of the upper Green River between the Tacoma Headworks gate and the Friday Creek gate (RM 61.0 to RM 83.9) are closed to the public to protect the quality of the drinking water supply. Tacoma is not required under the ESA to provide mitigation for public recreation in the HCP. On the contrary, Tacoma has

provided a Habitat Conservation Measure (HCM 3-03G) on road closures (maintaining locked gates) specifically to restrict use of roads in the upper watershed by the general public, except where USFS or WDNR policy requires that roads remain open.

IND 38-7

See General Comment Response 27 for a discussion of flow management and natural flow variations.

IND 38-8

Tacoma has developed this HCP to identify the operational procedures and mitigation measures that must be carried out in order to allow use of the Green River for public water supply while at the same time protecting the natural resources of the Green River. While this HCP does not assure that in-flows will equal out-flows under all conditions other than flood at Howard Hanson Dam, it does attempt to pay strict attention to the impacts of variations of river flows associated with the use of water by the City of Tacoma. In general, recreational boating will see an improved number of days for whitewater activities in the late spring but a reduced number of days in the late winter and early spring during the water storage period. This storage period has currently been selected and will subsequently be modified to be most compatible with the protection of salmon in the Green River system.

IND 38-9

The Green River Flow Management Committee will include representation from the public. Actual decision-making will be by the USACE, NMFS, and USFWS, but other agencies and the public will also be represented.

IND 38-10

The provisions of the HCP do assume that the Additional Water Storage Project at Howard Hanson Dam will be approved. This project has been approved by Congress in the Water Resource Development Act of 1999 and the NMFS and the USFWS are currently in the final stages of preparing a Biological Opinion regarding the project. If the Additional Water Storage Project at Howard Hanson Dam did not go ahead and if Tacoma subsequently chose not to implement the conservation measures included in this HCP, then the Services would revoke the ITP if issued. See General Comment Response 4 for additional information.

IND 38-11

See General Comment Response 25 for a discussion of quantifiable results and specific resource objectives for the HCP.

IND 38-12

Comment noted.

Comment Responses to Independent-39 (IND 39)

IND 39-1

Comment noted.

IND 39-2

Comment noted.

IND 39-3

See General Comment Response 11 and Specific Comment Response TRI 2-53. The statement that the Natural Zone includes a "200-foot no-logging buffer" is incorrect. The entire Natural Zone, which is over 0.5 mile wide in places, is a no-harvest zone. The only allowable harvesting in the zone is for danger tree removal along roads, and for habitat enhancement.

Felling of danger trees within the Natural Zone will not remove a significant amount of the standing timber in this zone. Danger trees are classified as those trees that pose a potential imminent threat of falling onto a roadway and will consist of defective or leaning trees. Healthy trees that do not lean toward a road will not be felled in the Natural Zone. To assure that felled trees continue to contribute to the habitat within the Natural Zone, all danger trees that are felled will be left in the Natural Zone as part of the down wood component, unless removed to be used to meet one or more of the conservation measures of the HCP (HCM 3-01F).

Any habitat improvements that may be conducted in the Natural Zone will have prior review by the WDFW and written approval by the Services. This agency review will be conducted to assure that habitat improvement projects are consistent with the goals and objectives of the HCP.

The comment is correct in stating there are a number of utility rights-of-way adjacent to the upper Green River, including roads, a railroad, and powerlines. Except for the portions of roads on Tacoma Water lands, the Services and Tacoma Water have no authority to modify the management of the rights-of-way as part of the HCP. The conservation measures in the HCP account for the presence of the rights-of-way, however, to ensure that Tacoma Water's activities do not accentuate any negative impacts associated with them. The presence of rights-of-ways through the Natural

Zone only creates the possibility of selective removal of danger trees, and not "logging within the 200-foot buffer" as suggested in the comment.

IND 39-4

See General Comment Response 11 for a discussion of Tacoma Water's riparian management measures and the strategy for achieving properly functioning riparian habitat.

IND 39-5

See General Comment Response 11. This comment is misleading in that it does not take into consideration the presence of no-harvest riparian buffers throughout the Covered Lands. These buffers exceed in width and tree density the buffers recently prescribed by the Washington Forests and Fish Report. Uneven-aged management in the Conservation Zone would only occur in stands less than 100 years old outside the riparian buffers.

Thinning of conifer has been proposed by a number of authors as a means of increasing stand structural diversity to improve habitat conditions for wildlife (Carey and Curtis 1996; Carey et al. 1999; Emmingham 1996; Hayes et al. 1997). Late-seral forest stands are composed of trees in a wide variety of size classes. If the heavily stocked, even-aged stands in the Conservation Zone were allowed to develop naturally, tree growth would be inhibited as competition for light increased, until suppression mortality, disease or windthrow developed openings in the canopy. The even-aged condition can persist in a stand for decades, depending on tree species and environmental influences on the stand. Thinning allows the trees room to grow unconfined and allows younger trees to persist and develop into multiple canopy levels.

The retention of at least 50 healthy trees of the dominant and co-dominant size class will provide sufficient large trees to mimic old-growth conifer stands in Oregon and Washington (Spies and Franklin 1991). Spies and Franklin (1991) found that old-growth stands had on average 19 trees per acre with a dbh of at least 40 inches, while Tappeiner et al. (1997, as reported in Hayes et al. 1997) hypothesized that old-growth stands may have supported densities of about 50 trees per acre for much of their early development.

The elk and deer habitat enhancement projects discussed in the DEIS are mitigation for the federal Additional Water Storage Project, and not part of the HCP. They are treated as part of the baseline

condition for the HCP because they will occur regardless of whether Tacoma Water is issued an ITP for the upper watershed. They are noted in the DEIS for informational purposes only.

A number of species to be covered under Tacoma Water's ITP will benefit from the small openings that will be maintained to provide foraging habitat for deer and elk. Species such as the goshawk and olive-sided flycatcher will likely forage along forest edges and within small forest openings, while healthy deer and elk populations will provide prey and carrion for species such as the grizzly bear, Canada lynx, and gray wolf.

IND 39-6

See General Comment Response 11 for a discussion of Tacoma Water's riparian management measures and the strategy for achieving properly functioning riparian habitat.

IND 39-7

The commenter argues against the "logging of selective trees within 150 feet of any roads," and we assume the commenter is referring to the selective removal of danger trees as described in conservation measures HCM 3-01B and HCM 3-01C, forest management within the Natural and Conservation Zones.

The intent of HCMs 3-01B and 3-01C is to allow for a broad definition of "danger tree" that can be applied on a case-specific basis in the field. Given potential severe implications of leaving a danger tree standing (i.e., possible human injury or death), it is considered best management practice to allow the individuals maintaining and using a given road to determine what is and is not a danger tree. The safety of all parties using the roads on the Covered Lands is of the utmost concern to Tacoma Water. Conversely, the risk to fish and wildlife resources of having a broad definition of danger tree is relatively low because of the small number of trees that could potentially be affected on a managed landscape such as the Covered Lands. If a danger tree is felled in the Natural Zone within 150 feet of a road, it will only be removed if needed elsewhere to meet one or more of the conservation measures of the HCP.

The area of potential danger tree removal extends 150 feet from the road to account for trees on steep slopes above roads that can slide onto road surfaces once they fall. Similar slope conditions likely occur along streams. The relative large woody debris contribution of trees on steep slopes and

more than 100 feet from streams is relatively inconsequential if the area closer to the stream is actively managed for large woody debris recruitment (McDade et al. 1990). Nevertheless, as noted in HCP Table 5-2, the no-harvest large woody debris recruitment zone is 200 feet wide on all fish-bearing streams. Provisions for danger tree removal apply only to individual trees, and do not grant Tacoma Water the ability to "selectively log" in the Natural Zone or the no-harvest riparian buffers.

IND 39-8

Shade will be one of several factors considered when the Services evaluate the effectiveness of Tacoma Water's watershed management conservation measures. As noted in the 1993 federal report by the Forest Ecosystem Management Assessment Team (USDA et al. 1993), buffer widths of one-half the site-potential tree height provide over 70 percent of shade function, and little increased shade effectiveness is provided beyond one site-potential tree height. Assuming a site-potential tree height of 150 feet, buffer widths of 75 feet provide the majority of shade effectiveness, and little increase in effectiveness is provided by buffers over 150 feet wide.

The Tacoma Water HCP establishes no-harvest buffers at least 150 feet wide along larger streams (Washington Department of Natural Resource Type 1, 2, and 3). On smaller perennial streams (DNR Type 4) the no-harvest buffers will be at least 50 feet wide, and will be expanded to 100 feet wide at all sensitive areas such as confluences, low-gradient reaches, seeps, headwalls and stream origins. Type 5 streams are intermittent, non-fish-bearing streams that typically do not transmit water during the late summer months when the risk of adverse temperature impacts is greatest. The Services believe that buffers left along Type 5 streams (i.e., 25-foot no-cut inner buffers) and 25-foot partial cut outer buffers, sufficiently contribute to the protection of downstream habitats.

IND 39-9

See General Comment Response 11 for a discussion of Tacoma Water's riparian management measures and the strategy for achieving properly functioning riparian habitat.

The conservation "standards" for HCPs are not established by management plans on federal lands. Rather, it has been the Services' approach that the Northwest Forest Plan form the backbone of forest species conservation in the Pacific Northwest, and that HCPs be tailored to complement the efforts being carried out on those federal lands. The federal lands are expected to bear the brunt of species conservation efforts in this approach. The "standards" for HCPs are clearly spelled out as five issuance criteria in section 10(a)(2)(B) of the Act.

IND 39-10

The Services believe that there are adequate checks and balances in the proposed monitoring program, and therefore are not concerned that Tacoma Water is monitoring its HCP. In Chapter 6 of the HCP Tacoma Water has committed to specific compliance monitoring, effectiveness monitoring, and research funding that it will be held responsible and accountable by the Services over the 50-year term of the ITP. Tacoma Water has committed to submitting periodic reports to the Services describing its activities conducted under the HCP and results of its monitoring program. Reports are required to be certified as to their accuracy and completeness by a Tacoma Water official. Under the IA, the Service can request, and Tacoma Water must provide, any additional information related to the implementation of the HCP for the purpose of assessing whether the terms and conditions of the HCP are being fully implemented. The Services can also conduct inspections and monitoring in connection with the ITP in accordance with our regulations. If all else fails, the Services can revoke the ITP for noncompliance with the HCP, including monitoring.

IND 39-11

Refer to General Comment Response 1.

IND 39-12

See General Comment Response 2.

IND 39-13

Comment noted.

Comment Responses to Independent-40 (IND 40)

IND 40-1

Tacoma's availability of water from the Green River system is limited by numerous laws and regulations including the ESA and this associated HCP. Yield of water from the project is most directly limited by the state water rights held by Tacoma on the Green River, agreements with the Muckleshoot Indian Tribe, and commitments regarding flows made in this HCP. In these limitations, Tacoma may use and distribute the water available to the City from the Green River with some flexibility. It is anticipated that contracts and agreements will be developed throughout the term of the HCP, which will result in a varying use of water from the Green River throughout the term of the HCP.

IND 40-2

Tacoma's use of water from the Green River is regulated by the terms of its water rights issued under state law and by the terms of an agreement with the Muckleshoot Indian Tribe signed in 1995. The adequacy of these flows will be determined by the Services' review of this HCP. If this HCP is approved and an ITP is issued to the City of Tacoma then the flow requirements inherent in the HCP would supercede the commitments made by the City to its Second Supply Project partners.

IND 40-3

As specified in HCM 1-01, Minimum Instream Flows, Tacoma Water must constrain its water withdrawals during 15 July to 15 September to provide a flow of at least 225 cfs measured at the USGS gauge at Auburn. Tacoma Water must provide this minimum flow even if inflow is reduced due to widespread climatic warming. Estimates of climatic warming have been calculated and conservation measures were developed in recognition of this phenomenon.

See General Comment Response 26 for a discussion of adaptive management provisions of the HCP, and General Comment Response 17 for a discussion of increasing instream flows to provide additional natural resource protection.

IND 40-4

See IND 40-6 below.

IND 40-5

Comment noted.

IND 40-6

Tacoma Water can only develop an HCP for the land and activities on that land over which it has control. The Services must ensure that Tacoma Water can carry out the conservation measures proposed in the HCP and meet the biological objectives that have been mutually agreed upon during the development of the HCP. If the Services issue an ITP based on commitments in the HCP, the permit is valid for only the covered activities proposed in the HCP, the Covered Lands Tacoma Water manages, and for the Covered Species addressed in the HCP.

IND 40-7

For the purposes of the HCP, water supply is defined as the water which Tacoma is able to utilize under state water law as further restricted by agreements with other parties to meet the water needs of its customers in Pierce and King Counties.

IND 40-8

See General Comment Responses 14 and 15.

IND 40-9

See General Comment Responses 14 and 15.

IND 40-10

See General Comment Response 4.

IND 40-11

See General Comment Response 16.

IND 40-12

See General Comment Response 15.

IND 40-13

See General Comment Responses 17 and 27.

IND 40-14

See General Comment Response 16.

Comment Responses to Independent-41 (IND 41)

IND 41-1
Comment noted.

IND 41-2
Comment noted.

IND 41-3
Comment noted.

IND 41-4
See General Comment Responses 4 and 29.

IND 41-5
See General Comment Response 3.

IND 41-6
See General Comment Response 24.

IND 41-7
See General Comment Response 22 for a discussion of the preferred method of restoring adult anadromous fish access to the Upper Green River Watershed.

IND 41-8
See General Comment Response 17 for a discussion of instream flows and providing additional protection for fish and other aquatic resources.

IND 41-9
See General Comment Response 12.

IND 41-10

See General Comment Response 4.

IND 41-11

See General Comment Responses 7 and 8.

Comment Responses to Independent-42 (IND 42)

IND 42-1

Comment noted.

IND 42-2

See General Comment Response 17 for a discussion of instream flows and providing additional protection for fish and other aquatic resources.

IND 42-3

Comment noted.

Comment Responses to Independent-43 (IND 43)

IND 43-1
Comment noted.

IND 43-2
Comment noted.

IND 43-3
See General Comment Responses 2 and 26.

Under the authority of the ESA, the Services cannot demand that Tacoma Water do whatever is necessary to protect salmon, wildlife, forest, and river flows. Tacoma Water, like other HCP Applicants, must meet the issuance criteria for ITPs in Section 10(a)(2)(B) of the ESA. Tacoma Water is required under Section 10 of the ESA to minimize and mitigate the impacts of the taking of federally listed species to the extent practicable and to ensure that its activities do not appreciably reduce the likelihood of the survival and recovery of those species in the wild. For an additional description of these criteria refer to General Comment Response 3.

IND 43-4
See Specific Comment Response IND 43-3, above.

IND 43-5
See General Comment Response 4.

IND 43-6
Comment noted.

IND 43-7
Comment noted.

IND 43-8
See Specific Comment Response IND 43-3, above.

Comment Responses to Independent-44 (IND 44)

IND 44-1
Comment noted.

IND 44-2
Comment noted.

IND 44-3
See General Comment Response 24.

IND 44-4
See General Comment Response 22 for a discussion of the preferred method of restoring adult anadromous fish access to the Upper Green River Watershed.

IND 44-5
See General Comment Response 17 for a discussion of instream flows and providing additional protection for fish and other aquatic resources.

IND 44-6
See General Comment Response 21.

IND 44-7
See General Comment Response 12.

IND 44-8
See General Comment Response 4.

IND 44-9
See General Comment Response 7.

IND 44-10
See General Comment Response 10.

IND 44-11
See General Comment Response 8.

Comment Responses to Independent-45 (IND 45)

IND 45-1
Comment noted.

IND 45-2
Tacoma Water does not own or operate hydroelectric facilities on the Green River, and has not in the past. Additionally, Tacoma Water does not own a reservoir in the Upper Green River Watershed, but it does own and operate a 1.8-acre pool behind the Headworks at RM 61.5. With the implementation of the Second Supply Project, the pool behind the Headworks will increase to approximately 6 acres.

IND 45-3
Comment noted.

IND 45-4
See General Comment Response 7.

IND 45-5
See General Comment Responses 5 and 11.

IND 45-6
Comment noted.

IND 45-7
See General Comment Response 10. In addition to the road-related conservation measures summarized in General Comment Response 11, it should be noted that public access is restricted on Tacoma Water lands in the upper watershed. In addition to protecting water quality, this restriction minimizes the risks of trespass, poaching, fire, and disturbance of wildlife.

IND 45-8
See General Comment Response 10. Habitat Conservation Measure 3-03I already includes provisions for the abandonment of roads that are no longer needed on the Covered Lands.

IND 45-9
See General Comment Response 10.

IND 45-10
See General Comment Response 7.

IND 45-11
See General Comment Response 8.

IND 45-12
Comment noted.

IND 45-13
Comment noted.

Comment Responses to Independent-46 (IND 46)

IND 46-1

Comment noted.

IND 46-2, 3, and 4

Under the authority of the ESA, the Services cannot demand that Tacoma Water do whatever is necessary to protect salmon, wildlife, forest, and river flows. Tacoma Water, like other HCP Applicants, must meet the issuance criteria for ITPs in Section 10(a)(2)(B) of the ESA (General Comment Response 3). Tacoma Water is required under the ESA to minimize and mitigate the impacts of its activities on federally listed species to the extent practicable, and to ensure that its activities do not appreciably reduce the likelihood of the survival and recovery of those species in the wild.

The Services expect that for fish and wildlife species that depend on either old forest conditions, mature riparian habitats, or both, there will be a benefit from increases in habitat quality and quantity over the 50-year term of the HCP. Under conservation measures committed to by Tacoma Water in the HCP, approximately 8,316 acres of Tacoma Water's 14,888 acres would be managed by either no-harvest or uneven-aged harvest regimes to maintain and create mature and late-seral forest conditions. Riparian buffers on fish-bearing streams would be a minimum of 200 feet wide in the Conservation and Commercial Zones, and wider in the Natural Zone.

IND 46-5

Comment noted.

IND 46-6

See General Comment Response 3.

IND 46-7

See General Comment Response 5.

IND 46-8

See General Comment Response 4.

IND 46-9

Tacoma only owns approximately 10 percent of the Upper Green River Watershed and, therefore, can only contribute to the restoration of the Green River Watershed. Tacoma's commitments under the HCP to protect and grow mature and late-seral forest conditions, implement no-harvest riparian buffers, and harvest commercial timber on 70-year rotation for example, are much more restrictive and protective that what is required under state forest practices laws. If other landowners in the Green River Watershed committed to similar measures, we would anticipate that some level of watershed recovery would be noticeable in 50 years.

IND 46-10

See General Comment Response 24.

IND 46-11

See General Comment Response 22 for a discussion of the preferred method of restoring adult anadromous fish access to the Upper Green River Watershed.

IND 46-12

See General Comment Response 17 for a discussion of instream flows and providing additional protection for fish and other aquatic resources.

IND 46-13

See General Comment Responses 12 and 13.

IND 46-14

See General Comment Response 4.

IND 46-15

See General Comment Response 7.

IND 46-16

Comment noted.

Comment Responses to Independent-47 (IND 47)

IND 47-1

Comment noted.

IND 47-2

See General Comment Response 17.

IND 47-3

See General Comment Response 24.

IND 47-4

See General Comment Responses 12 and 13.

IND 47-5

See General Comment Response 4.

IND 47-6

See General Comment Response 7.

Comment Responses to Independent-48 (IND 48)

IND 48-1
Comment noted.

IND 48-2
Comment noted.

IND 48-3
Comment noted.

IND 48-4
See General Comment Response 17 for a discussion of instream flows and providing additional protection for fish and other aquatic resources. We have responded to the request for additional flows for recreation in General Comment Response 21.

IND 48-5
The effects of Tacoma Water's withdrawals under both its First Diversion Water Right claim and its Second Diversion Water Right are described in HCP Chapter 7. Howard Hanson Dam is a federal facility operated by the USACE. The storage of water behind Howard Hanson Dam under the Additional Water Storage Project is a federal activity that cannot be covered by the Section 10 ITP being requested by Tacoma Water. See General Comment Responses 12 and 13 for a more detailed description.

See General Comment Response 17 for a discussion of instream flows and providing additional protection for fish and other aquatic resources. We have responded to the request for additional flows for recreation in General Comment Response 21.

IND 48-6
Comment noted.

IND 48-7

Comment noted.

IND 48-8

Comment noted.

IND 48-9 through 48-11

See General Comment Response 21.

IND 48-12

Conservation measure HCM 2-08, Downstream Woody Debris Management Program, provides the opportunity for large woody debris to be introduced at several locations within the active channel of the Green River. The large woody debris would then be allowed to distribute naturally within the river as flow and the natural transport capacity increase. In addition to, or as an alternative to placing unanchored wood downstream of Tacoma's Headworks, select pieces of large wood may be anchored in the river rather than allowing flows to distribute the wood. Tacoma would work with the Muckleshoot Indian Tribe, the Services, other federal agencies, and state and local agencies with jurisdiction to select placement locations and procedures.

IND 48-13

See General Comment Response 19 for a discussion of the Woody Debris Management Program and recreational use of the Green River.

IND 48-14

Logjams present a risk to inexperienced river recreationalists. In the spring of 2000, a large, naturally formed logjam in the lower Green River caused a short reach of the river to be closed to water recreationalists to reduce the risk of injury. Conservation measure HCM 2-08 allows adjustments in wood volume, placement location, and placement procedure predicated on an evaluation of the volume of wood that would effectively contribute to natural stream processes, public health and safety, and flood control impacts. The intent is not to create artificial hazard conditions, but to restore natural functions to the Green River ecosystem.

Restoring a measure of natural ecosystem functions to the Green River may increase the level of risk to water recreationalists. Tacoma Water's HCP includes a monitoring plan that would allow the degree of benefit and the degree of risk to be monitored and adaptations incorporated as appropriate. See General Comment Response 18 for a discussion of the Woody Debris Management Program and the volume of wood under consideration, and see General Comment Response 19 for a discussion of the Woody Debris Management Program and recreational use of the Green River.

IND 48-15

The commenter is urged to review a 1997 handbook titled: "Fish Habitat Rehabilitation Procedures," which describes procedures and results of efforts to quantify increased carrying capacity and increased long-term fish survival associated with rehabilitating stream channels with large woody debris (Slaney and Zoldokas 1997).

The Slaney and Zoldokas (1997) handbook references numerous studies of resident trout streams that demonstrate that adding large woody debris to a stream deficient in structural complexity increases trout abundance. Because of the difficulty in tracking adult salmon returns, most studies of large woody debris rehabilitation efforts in anadromous fish streams have used smolt yield as a demonstration of success. Smolt yield refers to the number of anadromous juveniles produced in a river system and observed migrating downstream to the ocean. The commenter is correct that relatively few studies attempt to track adult salmon returns in years subsequent to rehabilitation efforts, but the demonstrated increase in smolt production is sufficient to justify careful pre-project evaluation, implementation, and monitoring of large woody debris rehabilitation efforts.

IND 48-16

The USACE annually removes approximately 8,000 to 10,000 cords of woody debris from the White River at Mud Mountain Dam (U.S. Army Corps of Engineers 1986). It is unknown whether this removal of wood has contributed to the decline of salmon populations in the White River.

As discussed in the following response, many factors have contributed to the long-term decline in salmon stocks. Should factors, such as hatchery harvest rates or ocean conditions have an overriding effect on wild salmon production, changing the volume of wood within streams may not show an immediate response in the number of adult returns. Protecting and restoring freshwater habitat conditions, including restoration of woody debris, would support salmon recovery efforts when ocean conditions improve.

IND 48-17

The commenter provides no evidence of a cause and effect between increased instream abundance of wood and declining salmon stocks. Rivers entering Puget Sound have only a small percentage of the volume of wood present in the late 1800s; regulatory changes in the 1970s have not increased the instream level of wood to natural levels of abundance.

It can be argued that adult wild chinook returns in the Pacific Northwest suffered noticeable declines starting in the early 1900s (Myers et al. 1998). During this period, hatcheries, hydropower, urbanization, agriculture, increased harvest rates, and logging impacts all contributed to the decline of adult salmon returns. Decade-long changes in ocean conditions also affect adult returns, and it is hoped that the recent trend to colder marine water temperatures off the Pacific Northwest coast will benefit Washington salmon stocks. Declines in salmonid abundance cannot be tracked to any single action; correction of any single action is unlikely to bring about a resurgence of salmon returns to historic levels of abundance.

IND 48-18

We consider the abundance of chinook salmon in the Green River to be indicative of a healthy stock; however, our efforts must be to protect and, if possible, improve habitat conditions in light of ongoing actions. As an Evolutionarily Significant Unit (ESU), Puget Sound chinook are considered to be threatened under the ESA.

Tacoma Water has included a variety of conservation measures to mitigate for activities proposed for coverage by a Section 10 ITP under the ESA. The likelihood of success of the conservation measures and the potential impact of Tacoma Water's covered activities will be evaluated when considering issuance of the ITP. We recognize that action incurs risk and will be carefully considering the degree to which Tacoma Water's complement of compliance, effectiveness, and research monitoring measures reduces risk to Green River natural resources.

IND 48-19

See General Comment Response 19 for a discussion of the Woody Debris Management Program and recreational use of the Green River.

Comment Responses to Independent-49 (IND 49)

IND 49-1

The 3.5-mile reach between Howard Hanson Dam at RM 64.5 and Tacoma Water's Headworks at RM 61.0 is a confined channel that does not contain the quality of salmonid spawning habitat found in downstream locations. The high-energy nature of the reach limits restoration opportunities; however, several conservation measures within Tacoma Water's HCP provide a level of protection and improvement to habitat conditions within the 3.5-mile reach. Conservation measure HCM 1-05, Tacoma Water Headworks Large Woody Debris/Rootwad Placement, is specifically designed to improve salmonid rearing habitat above Tacoma's Headworks. Gravel nourishment (HCM 2-09), including the use of gravel retention structures, can occur in the reach above Tacoma Water's Headworks if such locations are selected by the Muckleshoot Indian Tribe, federal, state, and local agencies with jurisdiction. Adult salmonids may not be intentionally planted in the reach between the two facilities, but spawning salmonids may use the reach if they fallback through Howard Hanson Dam after being planted in the upper watershed. If salmonid spawning and incubation in the reach is not successful, we expect the area to be readily colonized and utilized by juvenile salmonids moving downstream during their rearing lifestage.

IND 49-2

See General Comment Response 22 for a discussion of the preferred method of restoring adult anadromous fish access to the Upper Green River Watershed.

IND 49-3

The effects of Tacoma's water withdrawals and conservation measures on species and habitats in the lower reaches of the Green River are described in HCP Chapter 7. The effects of Tacoma's activities on the lower river have not been ignored, but the commenter correctly notes that many of Tacoma Water's conservation measures would have the greatest benefit to the upper and middle reaches of the Green River. Tacoma Water owns approximately 10 percent of the upper watershed and measures have been directed to reaches flowing among City-owned lands, or on reaches directly impacted by Tacoma Water's actions. In addition, much of the lower Green River is constrained by dikes and otherwise hydro-modified banks and flows through several local municipalities. King County and other local agencies have targeted habitat improvement projects within the lower river, and Tacoma Water is coordinating with those entities to avoid duplication of effort.

Comment Responses to Independent-50 (IND 50)

IND 50-1

See General Comment Responses 3 and 23.

IND 50-2

See General Comment Response 7. The commenter is correct in implying that forests influence water quality and stream function in a number of ways. As suggested in the comment, forest vegetation can: 1) stabilize soil and filter surface flows to reduce the amount of fine sediment entering streams; 2) moderate the effects of storm events on stream flows; 3) provide shade that can reduce peak surface water temperatures; and 4) provide physical habitat (large woody debris) for fish and wildlife (HCP subsection 5.3.2). All of these functions were considered in the development of the HCP, and all are accounted for in the riparian and upland management measures identified in Chapter 5 of the HCP.

Streambank integrity, vegetative filtering of surface flows, shade, and large woody debris would be provided by maintaining no-harvest forest buffers along all streams on the Covered Lands. Buffers will range from 25 feet wide on intermittent non-fish-bearing streams (DNR Type 5) to 200 feet wide on large fish-bearing streams (DNR Types 1 and 2). Streams within the Natural Zone would have even wider buffers. These buffers would meet or exceed the buffers prescribed by the recent Washington Forests and Fish Report, which represents the state of the art in commercial forestland management for fish and water quality.

IND 50-3

See General Comment Response 8.

IND 50-4

The Services and Tacoma Water agree that a flow regime that better mimics the natural flow regime of the Green River is desirable (see General Comment Response 27). Because it represents a small fraction of the highest flows in the Green River (less than 2%), Tacoma's withdrawal would not appreciably affect high flows in the Green River. Furthermore, because high flows generally also represent high turbidity events, Tacoma generally reduces or stops water withdrawal from the mainstem Green River during high flow events.

The primary factor influencing the flow regime in the Green River is operation of Howard Hanson Dam, which is the sole responsibility of the USACE, not Tacoma Water. As noted in General Comment Response 16, the primary vehicle for coordination and flow management adaptation in the future will be the Green River Flow Management Committee. Conservation measures and monitoring to be implemented by Tacoma Water under its HCP would facilitate development of a more natural flow regime if that is the target condition identified by the Green River Flow Management Committee.

IND 50- 5

See General Comment Response 17. Although Tacoma Water withdraws a substantial portion of the Green River flow during the summer, the minimum flow requirements to be implemented by Tacoma under its HCP would meet or exceed existing instream flow requirements set by Ecology (HCP subsections 5.1.1 and 5.1.2). During extreme, summer low-flow events, conservation measures in the HCP would increase the amount of water in the river compared to baseline conditions. However, Tacoma Water has limited ability to affect water temperature and pollutant concentrations in the middle and lower watershed.

IND 50-6

See General Comment Response 13.

IND 50-7

See General Comment Response 22.

IND 50-8

See General Comment Response 20. The purpose of an HCP is to minimize and mitigate the impacts of any incidental taking authorized by a Section 10 permit, and to ensure that issuance of the permit does not appreciably reduce the likelihood of the survival and recovery of the species in the wild. An HCP is not required to recover listed species or restore habitat damaged by past actions, although many HCPs, including Tacoma Water's, include measures specifically designed to rehabilitate habitat that is not currently considered to be functioning properly.

Interruption of gravel transport in the mainstem Green River has been primarily the result of construction and operation of Howard Hanson Dam by the USACE. Construction of the Tacoma Headworks in 1912 intercepted approximately 13,500 cubic yards of gravel, equivalent to about a 1-year supply of bedload (U.S. Army Corps of Engineers 1998; Perkins 2000). In contrast, Howard

Hanson Dam has intercepted virtually all of the bedload from the upper watershed for the past 37 years.

Moreover, Tacoma's proposed increase in the height of the Tacoma Headworks would not substantially influence the downstream transport of sediment. Raising the Headworks by 6.5 feet will result in approximately 43,000 cubic yards of increased sediment storage. Assuming that approximately 15 percent of the natural sediment load was bedload (Olympic National Park 1996), the structure would intercept approximately 6,500 cubic yards of gravel. The presence of Howard Hanson Dam upstream of the Tacoma Headworks currently prevents the downstream transport of gravel and larger-sized sediment. Consequently, the actual composition of intercepted materials is expected to be primarily fine sediments.

The volume of gravel-sized sediments that Tacoma Water proposes to add to the river would exceed the amount of material that would be intercepted by the raised Headworks. In addition, the increment of gravel placed by Tacoma under the HCP would be supplemented by gravel placed by the USACE as part of the Section 7 consultation process and jointly by the USACE and King County as part of the Green-Duwamish General Investigation Project. Together, these projects are expected to restore downstream movement of gravel.

IND 50- 9

See General Comment Response 18.

IND 50-10

See General Comment Response 4. Water conservation and reuse planning are integral components of Tacoma Water's efforts to protect and restore Green River aquatic resources. These methods alone are not sufficient to restore Green River instream resources and, therefore must be supplemented by other resource planning approaches.

IND 50-11

See General Comment Response 21.

King County Executive
RON SIMS

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
APR 10 2000
LACEY, WA
RECEIVED

April 7, 2000

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U.S. Fish and Wildlife Service
510 Desmond Drive SE, Suite 102
Lacey, WA 98503-1263

Mike Grady
National Marine Fisheries Service
510 Desmond Drive SE, Suite 103
Lacey, WA 98503-1263

Dear Mr. Romanski and Mr. Grady:

1 Thank you for the opportunity to review and comment on the Tacoma Water Green River Water Supply Operations and Watershed Protection Habitat Conservation Plan (HCP). The Plan clearly represents the hard work and dedication of the City of Tacoma (City) and Tacoma Public Utilities (TPU) elected officials and staff for over a decade working to make the Green River operations compatible with the environmental and resource needs of the watershed. We appreciate TPU's willingness to work with their regional partners and others to protect the ecological systems in the Green River watershed. On behalf of King County, I congratulate Tacoma for its accomplishments and efforts in working with the federal and state governments, tribal nations, and interested parties in a continued effort of regional cooperation and environmental protection.

2 King County appreciates the time and effort spent by TPU in working with King County staff to discuss and address our issues and concerns regarding TPU's operations and the proposed HCP. We particularly appreciate TPU's willingness to discuss the studies, planning, agreements, and commitments that are incorporated into this HCP.

3 We value TPU's efforts in reaching an agreement with the Muckleshoot Indian Tribe and addressing their interests and concerns regarding this project. This agreement forms the cornerstone of a collaborative relationship between the tribe and TPU and will benefit the resources of the Green River system and current watershed planning efforts. We also recognize and appreciate TPU's efforts to address the concerns of the resource agencies, environmental groups, recreational users, interested citizens, King County staff, and TPU's project partners in developing this project and the various elements contained in the HCP.

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4 The Green River water supply project presented in this HCP will supply water to people and industries in both Pierce and King Counties. Water from this project will supply communities in King County -- many which need additional water supply to support the growth projected under the Growth Management Act. We support TPU and its partners working collaboratively to develop resources to meet the water supply needs of the region. We continue to support the Second Supply Project, including the water supply and other commitments made with this project.

5 King County supports TPU and their efforts in securing an Incidental Take Permit for their water supply operations and watershed protection program. Through implementation of this HCP, TPU has committed to a significant early action that addresses Endangered Species Act (ESA) issues in the Puget Sound region. TPU's HCP exemplifies their efforts to address habitat and salmon ecosystem problems and provide leadership in protecting natural resources.

In reviewing TPU's HCP, King County has identified some concerns to be addressed by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (Services), TPU and King County. Addressing these concerns will benefit the watershed planning efforts in the Green River watershed. These concerns include:

6 **Flows in the Green River System.** The issuance of an Incidental Take Permit for TPU's water supply diversion will establish a flow regime for the Green River. This flow regime cannot be substantially or significantly modified through the efforts in the Water Resource Inventory Area 9 (WRIA 9) recovery planning effort. If this regime affects salmon recovery efforts and the ability to comply with the Clean Water Act in the Green River watershed, the Services and the federal government should recognize that the remaining parties developing Clean Water Act and ESA compliance programs may be restricted in their options by the commitment made regarding flows under this requested Incidental Take Permit.

7 The ecosystem and its resulting species have evolved to adapt and thrive with the natural flow regime. TPU's HCP concentrates on the summer low flow portion of the regime but needs to recognize that all flows are important for the survival of the species. For example, high winter flows produce off channel habitat and pools for salmon. Late winter-spring flows move smolts downstream and allow steelhead to migrate and spawn upstream. To meet the requirements of the multiple species and lifestage of salmon in the Green River, we request that the Services,

8 Corps of Engineers, resources agencies, Muckleshoot Tribe, TPU, King County and other interested parties work together to analyze, develop, and implement a more normative flow regime for the Green River within the storage volumes and flows provided in the HCP. King County believes that achieving a more normative flow pattern through adaptive management and other tools in the WRIA planning process will provide the best opportunity for ecosystem restoration and potential salmon recovery in the Green River system.

Fragmentation of Responsibilities. The interrelationship of this HCP and the Additional Water Storage Project, Second Supply Project, the Muckleshoot Agreement, and other agreements and commitments made by the City over the last ten years to support this HCP will require careful coordination to assure that the conservation measures and other elements that of the HCP are
9 comprehensive, provide certainty and allocate responsibility. We believe that working in the WRIA planning process provides the best opportunity to minimize fragmentation and assure optimum use of available resources and commitments in the Green River system. King County is committed to working with Tacoma and other project proponents to develop such a collaborative relationship.

Adaptive Management and Monitoring. Adaptive management and monitoring is perhaps the
10 most crucial element that ensures the long-term success of a plan that aims to reflect the dynamic aspects of both an ever-changing natural system and the evolving body of scientific knowledge. All elements and conservation measures in the HCP should be adaptively managed consistent with the Services guidance documents including: *Coastal Salmon Conservation: Working*
11 *Guidance for Comprehensive Salmon Restoration Initiatives on the Pacific Coast* (NOAA 1966), *Habitat Conservation Planning Handbook* (USF&WS and NMFS 1996) and *An Ecosystem Approach to Salmonid Conservation* (Spence 1996). This is necessary to address the effects of the proposed incidental take on the species.

Besides adaptive management elements regarding the flow regime that are described above, the following areas of concern are especially appropriate for an adaptive management strategy.

Upper watershed management for survival and recovery of species in the wild. King County recognizes that the upper watershed could be the key to restoring anadromous fisheries in
12 the Green River basin. Entities working towards recovery of salmon in the Green River basin rely on the management of the upper basin to meet the ESA goals. Therefore, monitoring and adaptive management of activities in the upper watershed are important elements for this HCP. Key concerns include:

Juvenile Salmonid Passage at Howard Hansen Dam - The HCP includes a cooperative effort
13 with the US Army Corps of Engineers to provide for improved downstream passage at the dam. Additional study and establishment of an appropriate biological goal should allow for lowering the mortality rate for chinook to significantly less that the 36 percent mortality projected in the HCP.

Hatchery Production vs. Wild Production - The HCP includes measures that are tied to possible
14 hatchery production and planting of these fish into the upper watershed. Impacts of such an action should be evaluated before being taken, and may have significant impacts on the recovery of wild salmon in the Green River watershed.

15 *North Fork Well Field* – The North Fork Well Field may be used up to ten months of the year and can significantly impact the North Fork Green River. The North Fork Green River may be an important tributary in the upper basin for restoring anadromous fish. The impacts of the use of the well field should be monitored and adaptively managed.

16 *Restoration of the Green River between the Dams* – The HCP provides minor planned restoration for the 3.5 miles of mainstem river between the Howard Hanson Dam and TPU's headwork's dam. This is a significant resource that would benefit from the same conservation measures that have been included in other reaches of the Green River system, including adult salmon introduction, gravel augmentation and large woody replacement.

17 **WRIA Planning Process**. King County appreciates TPU's participation in the WRIA planning process and expects that commitment to continue in the development of scientifically quantifiable goals for the entire watershed, including the areas covered by the HCP; monitoring to determine the effectiveness of the conservation programs, including the HCP conservation measures; and working within the WRIA conservation planning process to make the necessary changes to assist the WRIA in meeting these goals. King County appreciates TPU's flexibility to modify their HCP commitments and programs with the support of the Services and within the resource constraints of the HCP in an adaptive and cooperative management process.

18 King County is committed to working with the Services, TPU and other participants to develop a WRIA plan that addresses these and other issues in the Green River watershed. ESA mandates an ecosystem-based approach to species recovery. King County envisions a process whereby WRIA plans and TPU's HCP compliment one another in meeting the requirements of ESA and ensuring development and implementation of a comprehensive, multi-species recovery plan that is a joint effort of TPU, King County, the state, the federal government, the Muckleshoot Tribe, and other WRIA participants and stakeholders. King County believes that the commitments made in this HCP can be strengthened by a strong commitment by TPU to the WRIA recovery process that responds across the watershed to meet the requirements of the Endangered Species Act.

19 King County is leading the watershed planning efforts in the Green River watershed, WRIA 9. To assure success in these efforts, King County depends upon TPU's continued active involvement and financial commitment to the watershed wide conservation plan. It is through this process that issues and concerns raised by King County staff and others can be addressed. Therefore, we have requested that TPU enter a formal agreement with King County to partner with us and other WRIA participants in funding and implementing a watershed wide conservation plan. It is our intent that such an agreement would focus on a joint program of:

- Defining through the appropriate research and studies, protective and conservation elements for the WRIA 9 planning effort;

19 - Developing and implementing a comprehensive monitoring program for the WRIA;

- Commitment to adaptive management with structured actions and activities as well as studies to obtain needed information. This ensures that efforts and conservation measures form a coherent salmon conservation program.

20 Thank you for the opportunity to review this important HCP. Once again, we commend TPU for their dedication to address the natural resource issues in the Green River system. We appreciate the long-standing relationship between the City of Tacoma, TPU, and King County. We look forward to working with TPU in implementation of the conservation measures and agreements contained in this HCP.

Sincerely,

Ron Sims
King County Executive

RS:nd

cc: John Kirner, Tacoma Public Utilities
Colonel James M. Rigsby, US Army Corps of Engineers

DDES

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March 31, 2000

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Re: Draft Environmental Impact Statement –
Tacoma Water Habitat Conservation Plan Incidental Take Permit

Dear Ms. Badgley and Mr. Stelle,

1 We have reviewed the Draft Environmental Impact Statement (DEIS) that the U.S. Fish and Wildlife Service and National Marine Fisheries Service (services) have prepared for the proposed issuance of an Incidental Take Permit for the Tacoma Water Habitat Conservation Plan. Our comments are directed predominately towards the alternatives analysis, land use and regulatory compliance, and procedural and substantive compliance with the National Environmental Policy Act. We are also transmitting more detailed technical comments that were prepared by Herrara Environmental Consultants, Inc. on behalf of the King County Department of Natural Resources, Water and Land Resources Division. These are included as an attachment at the end of this letter.

2 One of the prime purposes of an environmental impact statement is to provide full and fair discussion of significant environmental impacts to inform decision makers and the public of the reasonable alternatives to avoid or minimize adverse impacts or enhance the quality of the human environment (40CFR1502.1). The alternatives analysis is the heart of the environmental impact statement and it should present the environmental impacts of the proposal and the alternatives in comparative form, sharply defining the issues and providing a clear basis for choice. 40CFR1502.14 requires that all reasonable alternatives be rigorously explored and objectively evaluated.

3 The discussion of alternatives is dispersed throughout the DEIS which makes it very difficult to compare the alternatives. There are also no quantitative or qualitative criteria
4 established for determining what is a reasonable alternative and inconsistent parameters are used to determine if an alternative should be considered for detailed study. It is not clear, for example, why an alternative that would reduce reliance upon or eliminate use of the North Well Fields was not considered. One of Tacoma's stated objectives for their upper watershed management plan is to improve water quality in the upper watershed. Given that turbidity is the only water quality parameter that seasonally exceeds Class AA
5 standards in the upper watershed, it must be concluded that the proposed watershed management habitat conservation measures would reduce or eliminate turbidity as a pollutant, which would reduce periods when the North Well Fields were utilized. (Sec. 2.2.2.1, page 2-30) In addition, under the proposed action, TPU would be able to obtain water from Seattle during periods of high turbidity, again reducing the need to withdraw water from the North Well field. There is no discussion in the DEIS of this alternative, yet with respect to their water supply and upper watershed management objectives, this alternative would meet Tacoma's needs. A more detailed discussion on alternatives is included in the attached comments from Herrera Environmental.

40CFR1502.16 requires that the DEIS include discussions of possible conflicts between the action and the objectives of local land use plans, policies and controls for the area concerned. The discussion of land use in Sections 1.6.5, 3.3 and 4.2 does not adequately address local land use, shorelines, critical areas or related polices or regulations that were specifically promulgated by King County in response to Washington State's Growth
6 Management Act (GMA). GMA is discussed briefly in Section 1.6.5 but only with respect to water supply planning. Many of the alternative management strategies proposed for the upper watershed are not only subject to WADNR Forest Practice Regulations, as noted in Section 3.3.2, page 3.6, but are also subject to regulation under King County's Shoreline Management Act, King County Code Title 25. There is no discussion in the DEIS of whether any of these alternatives are consistent with King County's Shoreline regulations.

Similarly, many of the habitat conservation measures proposed by Tacoma will require
7 permits from King County before they can be implemented. There is no discussion in the DEIS of whether any of these activities are compliant with King County's Shoreline regulations or regulations designed to protect critical areas including streams and wetlands. The habitat conservation measures summarized in Tables 2-11 and discussed in Section 2.4 are intended to mitigate for impacts resulting from Tacoma's operation of
8 their water right including management of the upper reservoir. These measures are not self-mitigating, yet there is no discussion of the environmental impacts that may be associated with each of these measures. For instance, there is no discussion of the

8 potential flood plain impacts associated with placing gravel into the Green River, nor is there a discussion in the DEIS of whether this activity, unmitigated, is compliant with King County flood plain regulations.

9 An environmental impact statement is intended to provide an impartial and unbiased evaluation. In many instances, this DEIS relies heavily upon statements provided by TPU without independent or objective evaluation. Most of the scientific information for this document appears to have been prepared by the same team that prepared the TPU HCP. (see DEIS, Sec. 6.0 and HCP CH 11) This raises many questions about how thoroughly and independently impacts and the effectiveness of mitigation have been evaluated. The conservation measures proposed for the upper watershed are intended to protect water quality. It is not clear how side cast road construction on slopes of 55% would protect water quality. (page 2-50). Similarly, statements (page 2-54) that timber harvest would

10 occur by clear cutting appears to contradict TPU's objective of protecting water quality. What analysis has been conducted to show that clearcutting is more effective at protecting water quality than selective harvesting or other aerial techniques that would reduce or avoid additional road construction? A more detailed discussion of this issue is provided in the comments from Herrera Environmental that are attached.

Thank you for the opportunity to comment on this DEIS.

Sincerely,

Randy M. Sandin, Supervisor
Site Development Services Section

Enc: (1) Herrera Environmental Consultants, Inc – King County Comments on Draft EIS

Herrera Environmental Consultants, Inc.

Memorandum

To Tom Nelson; King County Department of Natural Resources

From Kristine Lee, Wally Trial, and Craig Doberstein;Herrera Environmental Consultants

Date March 20, 2000

Subject Review of the DEIS and the HCP Water Quality Issues for the Tacoma Water Habitat Conservation Plan and Incidental Take Permit

We have concluded our review of the DEIS and the HCP water quality issues for the Tacoma Water Habitat Conservation Plan and Incidental Take Permit. In the letter dated July 27, 1999 to John Kirner, Deputy Superintendent, from Pam Bissonette, there were four primary areas of interest: fragmentation of responsibility, adaptive management and salmon conservation measures, flow regime, and flow removal. With regard to fragmentation of responsibility, it is still unclear what the interrelationship is of the Army Corps of Engineers operation of the
11 Howard Hanson Dam and the proposed fish restoration facility with the Muckleshoot Indian Tribe are and how they are incorporated into the cumulative effects analysis. Both of these have critical integration to the Habitat Conservation Plan and its potential success. The DEIS lists existing agreements but does not provide an adequate explanation of the impacts of other activities and how they relate to the impacts of this proposal. The other three areas of King County interest raised in the letter, hit many of the concerns we had in our review, many of them relating to flow, as you will see in our comments.

We would prefer an EIS to utilize a more quantifiable approach than this one has. There are very general descriptions given throughout the document that do not provide a clear picture of what
12 the site specific situation is in either the existing condition or in the projected environmental consequences. For instance, a description of factors that affect fish and fish habitat is valuable, but the critical part is applying that general information to the limiting factors in this site specific situation.

We are enclosing the water quality review of the HCP as a separate item.

We appreciate the opportunity to review these documents. If you have questions on our comments, please call Wally Trial at (206) 441-9080 or Kris Lee at (406) 251-8771.

King County Comments On Draft EIS for a Proposed Issuance of a Multiple Species Incidental Take Permit for the Tacoma Water Habitat Conservation Plan, Green River Water Supply Operations and Watershed Protection, King County, Washington
3/20/00

13 Overall, the DEIS is somewhat difficult to follow, with pieces of critical information spread throughout the document. Setting a clear picture of and context for the affected environment, with information such as flow graphs, maps of known wildlife habitat, and physiographic provinces, would answer the reader's questions earlier in the document and make the analysis of environmental consequences clearer. As noted by some of the comments below, more information is needed in several areas, particularly in the chapter on environmental consequences. Although additional information should be included for fisheries and aquatic
14 habitat, the DEIS would be greatly improved if wildlife and water quality were given the same level of treatment that fisheries has received.

14a A more thorough discussion is needed on mitigation measures, their effectiveness, and long term solutions if, through monitoring, it is discovered they are not working. It is of concern that mitigation will be scaled back if it exceeds a certain cost, rather than basing the commitment on achieving quantifiable resource objectives.

15 It is still unclear what the interrelationship is of the Army Corps of Engineers operation of the Howard Hanson Dam and the proposed fish restoration facility with the Muckleshoot Indian Tribe are and how they are incorporated into the cumulative effects analysis. Both of these have critical integration to the Habitat Conservation Plan and its potential success. The DEIS lists existing agreements but does not provide an adequate explanation of the impacts of other activities and how they relate to the impacts of this proposal. The DEIS also shifts the analysis and explanation of various important impacts onto other projects (e.g., "impacts of HHD water control activities on listed species are the responsibility of the USACE"). When, in fact, such activities and impacts are part and parcel of the proposed alternative.

16 The impacts of various agreements that are identified as a fundamental part of the proposed alternative, (e.g., river flow availability and hatchery development by the MIT/TPU Agreement), are not clearly presented for each of the alternatives. Impacts of the implementation of these elements for Alternative B (which are generally identified as habitat mitigation) are not well documented (e.g., impacts of hatchery development on Green River wild stocks).

17 Because of the complexities of water supply planning regionally (ongoing in the Green, Cedar, Tolt, and Sultan river basins) it is very difficult to understand if the cumulative impacts analysis presented in this DEIS have fully addressed the water supply issues. The DEIS fails to adequately address the impact(s) of this project on regional water supply planning.

Specific DEIS Comments by Chapter

Summary

18 Page S-3 (line 13-16). The statement "One additional watershed management option was identified during public scoping, but is not analyzed in detail as an alternative to the Proposed Action because it would not accomplish Tacoma Water's objective of managing its watershed lands to protect water quality as described in subsection 2.5" is used to justify rejection of an analysis of the additional watershed management option that would provide more habitat. This line of reasoning is flawed and rejects the analysis of an alternative which, from a scientific perspective, is perfectly reasonable.

19 Table S-1a. p. S-7. Fish Flows: While it is understood that this is a summary table, flows (cfs) in the river are identified here only for Alternatives A and C. River flows are not presented for the preferred alternative (Alternative B). Thus, a comparison of the alternatives is not possible from the data presented in this table. This does a disservice to TPU's presentation of fact and the reader who is interested in a summary comparison of the Alternatives.

20 Table S-1a. p. S-8. Fish LWD: Alternative A; the statement "LWD levels in the middle and lower river would decrease due to blockage of LWD inputs from upper watershed by HHD" refers to what? A decrease in LWD compared to what? Because Alternative A is the no action alternative, this statement is unclear.

21 Table S-1a. p. S-18. Surface Water Quality and Quantity. Road maintenance is identified as causing water quality problems under Alternative A. However, for Alternative B additional road maintenance is identified as reducing water quality impacts over that experienced in Alternative A. Please clarify.

Purpose and Need Chapter 1

22 Tacoma Water has clearly stated the Purpose and Need for the proposed action.

23 Relationship to Other Plans (p. 1-7). Several other plans are described here that interact with and potentially affect those species identified in the HCP. However, these plans are not discussed later in this document (Section 4.0) with regard to cumulative effects on covered species.

Alternatives Chapter 2

24 Table 2-1 Species proposed for coverage needs to be updated to reflect the current bull trout status under ESA as threatened.

25 The description of Water Withdrawal Alternative C as described in the DEIS (Sect. 2.2.4) is based on preliminary concepts without a detailed feasibility study having been completed. Without details of the plan for a new diversion structure and operation it is difficult to assess

25 later in the DEIS what the full range of environmental consequences may be. If Alternative C is selected, we suggest a supplement to the DEIS (or final EIS) be prepared to be consistent with 40 CFR 1502.9c.1.i. and to provide a more site specific analysis of the environmental consequences.

26 2.2.1.2 Reuse of Water (p. 2-24). The issue of water reuse as an option to reduce TPU's water consumption, and TPU's commitment to implement or enter into cooperative reuse projects with other entities are not addressed here. This discussion fails to identify plans to implement landscape irrigation reuse and dismisses industrial reuse as not cost-effective at only two industrial users investigated. TPU appears to have dismissed water reuse as an option to reduce withdrawals from the Green River.

27 Summary. p. 2-28. The statement " With the exception of a new diversion, the options described above are technically, economically, or environmentally infeasible to serve as an independent source for water supply, and therefore no included in the Proposed Action or the two alternatives" is confusing. While the South Tacoma Aquifer Additional Wells may not serve as an "independent" water supply source, it apparently could serve as an additional water source. It is unclear from the information presented why the STA Additional Wells are technically, economically, or environmentally infeasible.

28 The statement on page 2-29, line 30-31, "However, this option would provide certainty that: 1) take is avoided or reduced, or 2) current and future water supply demands could be met" appears to be a typographical error.

29 The discussion of water withdrawals from the North Fork Well Field described on p. 2-30, line 23-29, for Alternative A (and Alternative B, page 2-33) are not addressed under Section 4.0 Environmental Consequences. What are the potential impacts to fish and other aquatic organisms in the North Fork during worst case well field pumping, especially for the proposed action (Alternative B)?

30 Forest Management in Three Zones (p. 2-54). Statements that timber harvest "would occur by clearcutting" for both conifer and hardwood species appears to contradict previous statements that TPU's objective of managing its watershed lands is to protect water quality. Please provide evidence that clearcutting provides a higher level of water quality protection than selective harvest techniques, including helicopter logging.

31 The statements presented on p. 2-66, 2.5.1, to dismiss the analysis of an alternative to provide greater habitat benefits (above those identified in Alternative B) are confusing. How was it determined that "an alternative that would provide greater habitat benefits than the HCP (i.e., Proposed Action) would require timber-harvest activities in the Natural Zone"? And why is it presumed that the only timber harvesting that could occur in the "Natural Zone" would be by clearcutting? Even if tree harvesting did occur in the "Natural Zone", application of protective measures as required by WDNR (e.g., riparian buffer zones, etc.) would be expected to protect water quality, would they not?

Affected Environment Chapter 3

32 Bull trout – The DEIS and HCP combine the analysis of bull trout and Dolly Varden into one description on life history, habitat requirements, current distribution, stock status, and the environmental consequences of alternatives. The reason for lumping was cited as being that the two species are closely related and the Washington Department of Fish and Wildlife manages them together as "native char" (HCP, p.4-51). Although we understand the state manages them together, we have concerns that for the purposes of this HCP and DEIS they are not considered separately. They are separate species, with different life history and habitat requirements; the Dolly Varden being an anadromous species and bull trout being primarily adfluvial or fluvial. Of primary concern, is the fact that bull trout is a federally listed species under the Endangered Species Act and Dolly Varden is not. There is a potential that the effects of implementing different alternatives may be different on the two species because of differences in life history. Additionally, the description of life history has combined literature specific to inland bull trout (Fraley and Shepard 1989, Pratt 1984,1992; Rieman and McIntyre 1993) with earlier work that pertains to Dolly Varden or the two, now separate species, when they were one (Armstrong and Morrow 1980; Wydoski and Whitney 1979). This adds to confusion on the difference between the two species.

33 The current status of bull trout and Dolly Varden in the drainage is unclear. It would be helpful if more information were available on that topic. Under the first paragraph under Topic 3.8 (p. 3-31) bull trout and Dolly Varden are not mentioned as currently occurring. However, p. 3-39, does list occasional observations over the years. Additional information on when, where and what type of surveys have occurred for native char might help clarify the likelihood of the presence of either of the species. We support the research and monitoring aspect of the HCP that will help obtain more information on bull trout and other federal or state listed species.

34 The discussion of peak flows in Chapter 3 includes a statement " … peak flow events may be detrimental to fish production…" (Page 3-67, second paragraph, last sentence) that we find misleading and somewhat contradictory to the discussion on page 4-17 of the HCP Paragraph 2. We encourage Tacoma Water to include the wording from the HCP in the EIS that recognizes the value of the full range of variation in hydrologic regime for aquatic and riparian ecosystem function.

35 Is there any information on the effectiveness and fish loss due to stress associated with the current experimental trap/haul project? Is there a comparable project elsewhere that has collected and evaluated such information? This would be valuable information to evaluate the effectiveness of the proposed mitigation for trapping and hauling.

36 The DEIS and the HCP are lacking adequate detail on the status and potential effects of the alternatives on wildlife species. Twenty-one species of amphibians, birds and mammals are covered under this plan. For those that are known to be present in the watershed and those not present but suitable habitat exists should have at least the same level of detailed information and analysis as the fish species covered under the plan. For example, the Olive-Sided Flycatcher (*Contopus cooperi*) is a species of concern and covered under the HCP. The HCP is predicted to

have positive effects by increasing amount and quality of their habitat and protecting forests around wetlands. Negative impacts are also expected from habitat loss and nest destruction during timber harvest. A summary statement in the HCP (p. 7-183) states "the HCP will benefit the population existing in the basin, since there are no requirements to protect habitat for this species under current state or federal laws." This does not answer basic questions like how much
37 of their habitat will be affected – what is the anticipated percentage of increase in habitat, what is the amount of habitat expected to be lost, how long will it take before it qualifies again as habitat for the species. Riparian management measures are expected to improve their habitat yet the water supply and diversion alternatives are not anticipated to have an effect on the species even though riparian habitat will be altered as a result of changes in water flow. We have just used this one species as an example of the information that needs to be included for most of the wildlife species covered under this plan. A map of known habitat in the basin for all protected
38 wildlife species would also be very beneficial.

Environmental Consequences Chapter 4

Page 4-3 (Line 22-25) states the following "However, because Tacoma's activities (e.g., management and operational activities of the Upper Watershed, Second Supply Project, and
39 Headworks Diversion) would occur simultaneously with the USACE's Additional Water Storage Project activities, some impact analyses demonstrate joint adverse or beneficial effects", requires further clarification. Adverse or beneficial impacts arising from the multiple projects (i.e., cumulative impacts) are not clearly identified in this DEIS.

There is a detailed analysis presented on page 3-7 of existing water quality in the lower and
40 middle Green River watershed. However, this same level of analysis is not presented later in section 4.0 (Environmental Consequences) for these same sections of the river for each of the alternatives. Thus, it is not possible to readily compare and evaluate the water quality impacts that would arise from each of the alternatives presented in this DEIS.

41 DEIS p. 4-55 Figure 4-8a is labeled incorrectly.

42 Table 4-7, referred to on page 4-91, is missing.

43 Upper Watershed Alternative C calls for no commercial timber harvest and no salvage harvest except for removing trees to maintain safety along roads. It would be beneficial to address whether there will be any increase in risk of wildfire under this scenario.

Outmigration window for several fish species starts as early as mid-February. There are two maximum 2,500 cfs (at Auburn) (1,250 cfs in dry years) freshets proposed for 38 hours each to enhance outmigration, planned to occur in May and June of each year. Two 38 hour periods do
44 not seem adequate to cover the entire span of species and time periods. We are concerned that these may not be enough to enhance juvenile outmigration particularly for those species that begin their migration earlier in the spring. Appendix B provides the result of an outmigration predictive model that predicts a decrease in outmigration success for at least chum salmon. Table

44 4-3 of the HCP shows a natural flow regime mean of 4.6 freshets per year. We would like to see consideration of additional planned freshets to target those species that begin their migration earlier in the spring. In addition, we would like to see the criteria to be used to determine optimum timing of the freshets.

45 The HCP (p. 4-17) defines spring freshets as being flows greater than 2,500 cfs rather than a maximum of 2,500 cfs as implied in the DEIS. Please provide additional information that supports the determination that a maximum 2,500 cfs (potentially lower) spring freshet will be adequate flow to enhance outmigration?

46 We recommend Tacoma consider fall freshets to provide attraction flows for upstream migration of salmonid fall spawners.

47 Effects of several activities have not been disclosed – short term effects of road abandonment, culvert removal, excavation, construction, etc. For example, page 4-107 states "road abandonment sometimes results in short-term increases in sediment inputs…" disclosing that short-term adverse impacts may occur but not providing any disclosure of how much sediment, when and how long it may occur, and what the effects could be fish and fish habitat. NEPA requires an analysis adequate to support a full comparison of alternatives including discussions of direct and indirect effects and the means to mitigate adverse environmental impacts (40 CFR 1502.16)

48 Alternative B and C for water withdrawal include the introduction of gravel in the middle river to enhance spawning habitat. The HCP provides modeling results that show natural peak flows to being in the 10,000-20,000 cfs range for wet years and over 5,000 cfs in a dry year (Figure 4-3). The preferred alternative for water withdrawal (Alt. B) will further reduce flows at Auburn by up to 400 cfs during March through mid-April and reduce average flows by 100 cfs except minimum instream flows during the summer and no proposed increase in peak flows (Table S-1a). Additional information to support gravel placement as an effective mitigation tool to compensate for loss of spawning habitat is needed. There is also a proposal for gravel to potentially be placed in between the dam and Tacoma's Headworks. Under this plan, adult fish

49 will be trapped and hauled past this river section. The intent of this aspect of the proposal for gravel placement is not clear.

50 Alternatives B and C for water withdrawal are predicted to have both positive and negative consequences on fish and fish habitat. It would be helpful to see a clear summary of the sum of the predicted increases and decreases. It is still unclear if there is an overall positive or negative impact on each species, and the extent of that impact.

51 NEPA requires that the environmental impacts of the proposal and the alternatives be presented in a comparative form, sharply defining the issues and providing a clear basis for choice (40 CFR1502.14). In our review of the consequences of Alternatives B and C (water withdrawal) on wildlife habitat, there are differences that have been documented on pages 4-75 and 4-83. However, in the review of the impacts on wildlife populations for the two alternatives, the

51 impacts and descriptions are exactly the same. To clearly differentiate between the two, additional details of the level of impacts on wildlife populations need to be provided.

52 Upper Watershed Alternatives B and C are proposing roads will be abandoned at "a more accelerated rate" than Alternative A. To understand the potential impacts and the degree of difference between the alternatives, it would be helpful to have a quantification of the rate of proposed road abandonment for each alternative.

53 Social and Economic Conditions. The section in Affected Environment (p. 3-85), discusses jobs associated with the timber sale program occurring under Alternative A. We would like to see a disclosure of the anticipated number of jobs that will be affected with implementation of each alternative in the environmental consequences chapter. There is no discussion of this point at all. In the table in Section 4.3.10.1, please provide additional explanation of what activities are included under the "Cost" columns (i.e. how much is road maintenance, how much is animal damage control, etc.)

Cumulative Effects

54 The descriptions of physiographic provinces, land types and management strategies (starting p. 4-166) would be more valuable to have in Chapter 3, Affected Environment, to help set the context for all of Chapters 3 and 4.

55 Loss of estuarine habitat is mentioned as a "primary habitat concern" in the cumulative effects analysis (p. 4-204). King County would like to see more analysis in the Environmental Consequences chapter on the effects of the alternatives on estuarine habitat, particularly with regard to alteration of flows.

56 The Cumulative Effects section provides a general discussion of other management plans, land and water uses, and aquatic protection measures. However, it has focused primarily on the restoration and protection aspects of most activities and we are still missing a clear picture of what the anticipated effects are on the focus species for this HCP. For instance, we have concerns about the proposed Fish Restoration Facility, per the 1995 written agreement between the Muckleshoot Indian Tribe and the City of Tacoma, and how the production from that facility may affect existing stocks. More details are needed on this and other activities to assess the cumulative effects of the proposed HCP.

Other Comments

57 We are concerned that many of the mitigation measures have cost caps that will dictate the level of mitigation. We recommend Tacoma Water base the mitigation measures on achieving resource objectives rather than a financial constraint.

58 Tacoma Water is proposing work in Lower Bear Creek that needs further clarification. The proposal is to confine the channel and selectively remove riparian hardwoods to open up the

canopy and plant conifer seedlings with the goal of improving riparian habitat. This does not appear, in the description, to be riparian improvement. Hardwoods provide diverse structure in the riparian system. It also contradicts the goals in the HCP (p. 5-81/82) on hardwood conversion, which provides an exception to converting hardwoods in riparian corridors in the upper watershed. We would like more details on confining the channel of Lower Bear Creek and if this will reduce riparian habitat and have a negative effect on riparian dependent species.

58

59 Several measures in the HCP require seeding or vegetation planting for erosion control on disturbed soils. We would like to see native plant species used for the revegetation.

60 In the HCP, it would be helpful to refer to other related measures; for example, HCM 3-01G on snags should also direct the reader to HCM 3-04S and HCM 3-04T which have additional snag specifications.

61 Appendix B of the DEIS provides the results of predictive modeling on survival values and habitat variables for chinook, coho, chum and steelhead. These results provide valuable information for comparing alternatives for those species. Expanding this modeling effort to the other species and taking the analysis another step further to describe what this means to the aquatic ecosystem would provide worthwhile quantitative information on the predicted impacts of the three alternatives. In addition, describing the modeling results in the context of the predicted effect on fish populations is recommended. For example if Alternative B is predicted to increase survival for outmigrating steelhead fry by a mean of 1.31%, is this expected to be a significant increase that would lead toward the recovery of the population? When combining this prediction with results from spawning habitat changes, what are the overall predictions for contribution to recovery of the population? This is the type of information needed to understand the effects of the HCP and DEIS and whether this plan will provide the needed conservation measures for covered species.

DDES
King County
Department of Development
and Environmental Services
900 Oakesdale Avenue Southwest
Renton, WA 98055-1219

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APR 14 2000
U.S. FISH & WILDLIFE SERVICE
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April 7, 2000

MAY 1 2000

Anne Badgley
Regional Director
U.S. Fish and Wildlife Service
911 N.E. 11th Avenue
Portland, Oregon 97232

William Stelle, Jr.
Regional Director
National Marine Fisheries Service
7600 Sand Point Way, S.E.
Seattle, Washington 98115

Re: Draft Environmental Impact Statement –
Tacoma Water Habitat Conservation Plan Incidental Take Permit

Dear Ms. Badgley and Mr. Stelle,

We would like to submit the following EIS comments on behalf of King County in addition to the previous comments sent on March 31, 2000. Please excuse this complication, it is due to an internal coordination problem.

1 ✓ The assessment of impact upon chinook assumes that fry outmigrate in April to June. The Washington Department of Fisheries screw trap at approximate RM 33 has been collecting naturally produced chinook fry since it was put into commission in early February of 2000. It's reasonable to assume that migration was occurring in late January 2000. The assessments and EIS analysis should be adjusted to reflect this extension of the outmigration timing.

2 ✓ The HCP language should be modified to avoid confusion regarding laddering the Tacoma headworks dam. Page 7-3, line 27 states "this upstream passage approach (trucking fish) was selected in lieu of laddering" yet in 5.1.3 page 5-21, line 6 the HCM 1-03 states "and by adding an adult fish ladder..." It may be that the statement on page 7-3 is referring to laddering the Howard Hanson dam if so, this should be clarified.

3 ✓ The effect of fish falling over the Tacoma headworks dam is omitted from the EIS and should be assessed. There could be a mortality factor involved with plunging onto the apron below.

4 ✓ The EIS does not include an assessment of project impact upon spring chinook and should be added to the impact analysis. Little current effort is directed toward enumeration of potential spring chinook stocks downstream of the diversion dam, however, some documentation does exist in the WDF&W Spawning Ground Database. Spring chinook would be expected to use the upper watershed and the proposed reintroduction may help to produce a significant, self sustaining run.

Thank you for the opportunity to provide these additional comments on this DEIS.

Sincerely,

Randy M. Sandin, Supervisor
Site Development Services Section

King County
Water and Land Resources Division
Department of Natural Resources
201 South Jackson Street, Suite 600
Seattle, WA 98104-3855
(206) 296-6519
(206) 296-0192 FAX

U.S. FISH & WILDLIFE SERVICE
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February 16, 2000

Tim Romanski
United States Fish and Wildlife Service
510 Desmond Drive Southeast, Suite 102
Lacey, WA 98503-1263

RE: Request for Extension of Review Period:
Tacoma Public Utilities Habitat Conservation Plan (HCP),
Services Draft Environmental Impact Statement (DEIS) and
Implementing Agreement for the Tacoma Habitat Conservation Plan (IA)

Dear Mr. Romanski:

1 To allow for adequate review of the above referenced documents, King County requests an extension of the comment period for an additional 60 days to May 15, 2000.

2 The documents reflect years of work that will require much coordination within various departments and scientific expertise of King County. The EIS, HCP and IA have serious implications for our salmon recovery efforts, as well as other species and ecosystem processes in the watershed. We believe that the Services will eventually appreciate the quality of comments regarding these important issues that the extension will facilitate.

3 Please add King County to the official distribution list for any future mailings. We did not receive the initial mailing due to this omission which resulted in our loss of two weeks during comment period.

4 Any future mailings should be mailed directly to me, as I will be coordinating the response. My phone number is (206) 296-8012, fax (206) 296-0192, e-mail address tom.nelson@metrokc.gov.

Sincerely,

Tom Nelson

Tom Nelson
Senior Ecologist

TN:pa04

cc: Mike Grady, National Marine Fisheries Service

4.5 MUNICIPAL AGENCY COMMENT LETTERS

Comment Responses to King County Executive-Ron Sims (MUNI 1)

MUNI 1-1
Comment noted.

MUNI 1-2
Comment noted.

MUNI 1-3
Comment noted.

MUNI 1-4
Comment noted.

MUNI 1-5
Comment noted.

MUNI 1-6
See General Comment Response 26 for a discussion of the adaptive management provisions of the Tacoma Water HCP, and General Comment Response 17 for a discussion of increasing instream flows to provide additional instream resource protection.

As noted in HCP subsection 3.3.3, Regulatory Requirements and Processes-Clean Water Act, issuance of an ITP does not prevent other agencies with jurisdiction from exercising their authorities, nor would it exempt Tacoma Water from complying with other pertinent laws and regulations.

MUNI 1-7 and 1-8
The Services believe that ecosystem restoration and salmon recovery in the Green River system could be improved through adaptive management and the use of the other tools developed in the

HCP and WRIA 9 planning processes. See General Comment Response 27 for a discussion of the flow management and the Green River natural flow regime.

MUNI 1-9

Comment noted.

MUNI 1-10

Comment noted.

MUNI 1-11

See General Comment Response 26 for a discussion of the adaptive management provisions of the Tacoma Water HCP. See also General Comment Response 28 for a discussion on the use of best available science for development and implementation of conservation measures in HCPs.

MUNI 1-12

Comment noted.

MUNI 1-13

The objective of the downstream fish passage program at Howard Hanson Dam is to maximize the survival of salmonids passing downstream through the project while meeting Congressionally authorized project functions. These Congressionally authorized and mandated project operations include flood control, low flow augmentation, and storage of up to 20,000 acre-feet of water for municipal use. The 64 percent survival value was not intended as a guaranteed minimum, but represents the best available, preliminary estimate of survival of juvenile chinook passing downstream through the Howard Hanson Project once the Additional Water Storage Project is completed. Based on comparisons to other projects, the majority of mortality is expected to occur as juvenile salmonids pass through the Howard Hanson Reservoir. It is difficult to predict the survival of juvenile chinook passing through a reservoir, and all parties involved are hopeful that post-project monitoring results exceed the preliminary estimates.

MUNI 1-14

The HCM 2-05, Juvenile Salmonid Transport and Release, provides for the transportation of juvenile salmonids into the upper watershed if such activity is determined to be beneficial to Green

River fish runs by the NMFS and USFWS. The transport and release of juvenile salmonids is contingent upon a number of factors, including approval by the Services of the Fish Restoration Facility and its intended uses. If necessary, permits to operate the Fish Restoration Facility, and the release of fish into the upper watershed in compliance with the ESA would be sought by the Muckleshoot Indian Tribe separate from Tacoma Water's ITP. These actions would undergo NEPA review independent of the HCP.

MUNI 1-15

As described in HCM 1-01, Minimum Instream Flows Under the First Diversion Water Right, Tacoma would restrict use of the North Fork Wellfield to periods when the turbidity of Green River surface water supplies approach 5 NTUs, unless emergency conditions require use of the North Fork aquifer in lieu of surface water. Tacoma Water has also committed to conduct a study to identify the physical effect of the rate of well field pumping on stage changes (i.e., water level changes) in the lower North Fork channel in consultation with the NMFS and USFWS within 2 years following signing of the ITP. The study must be designed and completed in coordination with the NMFS and USFWS and submitted to the Muckleshoot Indian Tribe and local, state, and other federal resource agencies for review and comment. The results of the study would be used to identify a maximum rate of pumping that maintains a pumping-related stage reduction of no greater than 1 inch per hour in selected adult salmonid refuge areas within the lower North Fork channel as determined by the NMFS and USFWS. The Services share the commenter's concern regarding instream resources of the North Fork Green River. If an ITP is issued, the Services would monitor Tacoma Water's implementation of its commitment to ensure that the instream resources of the North Fork Green River are adequately protected.

MUNI 1-16

<u>Large Woody Debris</u>

Under HCM 1-05, Tacoma Water Headworks Large Woody Debris/Rootwad Placement, large woody debris and rootwads would be placed in the reach between Howard Hanson Dam and Tacoma's Headworks. The intent of this measure is to provide stable, individual pieces of wood to function as an individual habitat structure. Since large woody debris does not pass on its own through Howard Hanson Dam, we do not expect that wood placed upstream of the Headworks would intercept and collect enough free-floating wood to form large, complex woody debris jams.

Gravel Augmentation

Under HCM 2-09, Mainstem Gravel Nourishment, gravels can be placed between Howard Hanson Dam and Tacoma's Headworks. Tacoma's commitment is to "work with the Muckleshoot Indian Tribe, federal state, and local agencies with jurisdiction to select gravel placement locations." However, preliminary evaluations suggest placement immediately below Howard Hanson Dam would provide little benefit due to the incised nature of the channel and the high rate of sediment transport (Perkins 2000).

Adult Salmon Introduction

Tacoma Water has committed to constructing an upstream fish passage facility that would allow adult salmonids to be transported and released above Howard Hanson Dam, but could also be placed into the 3.5-mile reach between Howard Hanson Dam and Tacoma's Headworks. As noted in HCM 1-03, "Upstream migrating adult salmonids could be released into the reach between the Headworks and Howard Hanson Dam if deemed beneficial by the Muckleshoot Indian Tribe and Washington Department of Fish and Wildlife in coordination with the Services."

MUNI 1-17

Comment noted.

MUNI 1-18

Comment noted.

MUNI 1-19

See General Comment Response 16 for a discussion of Tacoma Water's coordination with other landowners and managers in the Green River Watershed.

We understand that Tacoma Water is actively involved in the WRIA 9 planning process, and that Tacoma Water staff serve on both policy and technical committees of the planning effort. Tacoma Water has indicated it is fully supportive of partnering with King County and other WRIA 9 participants to enhance salmonid recovery efforts in the Green River Watershed, provided it does not conflict with Tacoma Water's obligations and commitments identified in the HCP and IA with the Services.

MUNI 1-20

Comment noted.

Comment Responses to King County Department of Development and Environmental Services (MUNI 2)

MUNI 2-1

Comment noted.

MUNI 2-2

Comment noted.

MUNI 2-3

Please refer to subsection 2.1, Introduction, for a discussion of the alternative format. The DEIS analyzed both water withdrawal-related and upland-related alternatives. These two sets of alternatives were separated in the DEIS for readability and because the withdrawal and harvesting actions are interrelated, but not interdependent. Subsection 2.1 also indicates that all withdrawal and upper watershed harvesting alternatives are compared and summarized in Tables 2-18a and 2-18b. However, the upper watershed alternatives were not compared to the withdrawal alternatives because these are very different and distinct management actions that do not contain similar criterion for comparisons.

MUNI 2-4

The Proposed Action analyzed in the DEIS is the request for issuance of an ITP from each of the Services. The primary purpose surrounding each alternative to the Proposed Action is to analyze conditions that would affect protected species under the federal ESA while meeting Tacoma's stated purpose and need; alternatives outside of these parameters were considered infeasible.

The purpose and need of the Proposed Action as stated in subsection 1.2 of the DEIS is to respond to Tacoma Water's permit application in a manner that: 1) provides protection and conservation to listed and proposed species and their habitats to the extent intended under Section 10(a)(1)(b) of the Act, and 2) allows Tacoma Water to fulfill its water supply obligations in a practical manner. The environmental review process must focus on this Proposed Action, the stated purpose and need for the action, and alternatives to the Proposed Action that will fulfill the purpose and need.

The Services conducted lengthy internal and public scoping to develop a reasonable range of alternatives for inclusion in the DEIS analyses. We worked closely with Tacoma Water to develop water withdrawal alternatives that could feasibly be implemented and that, therefore, warranted analyses. The background for determining those types of withdrawal alternatives that would fulfill Tacoma Water's purpose and need and that would avoid take is included in subsection 2.2.1, Background and Identification of Water Withdrawal Alternatives. The Services reviewed four other potential water withdrawal options, but determined they could not be feasible alternatives because they did not meet the Services' purpose and need or were too speculative for an adequate impact assessment as stated in subsection 2.3, Water Withdrawal Options Raised During Scoping.

Similarly, the Services believe there are no other feasible alternatives to Tacoma's request to annually harvest 80 acres of the upper watershed under the HCP scenario than those included in the DEIS (i.e., no ITP issuance and no harvest). Again, these alternatives were developed after review of all public comments and during internal scoping procedures, and include a management alternative in addition to the appropriate alternative to ITP issuance, which is no ITP issuance.

MUNI 2-5

The commenter assumes that water will be available to Tacoma from the Seattle service area. This is not true. Tacoma's Second Supply Project will be able to move water into the Seattle service area from the Green River; however, Seattle's legally allowable place of use for Cedar River water would not allow delivery of water to the Tacoma service area. The commenter is correct that Tacoma's watershed management plan objective is to improve water quality in the upper watershed. However, even under natural conditions, high turbidity runoff is common in watersheds in the western Cascades. As an example, Seattle's Cedar River Watershed has periods of extreme turbidity even though it is maintained in a far more natural condition than the Green River Watershed. During such periods of high turbidity, Seattle utilizes the supply stored at Lake Youngs similar to Tacoma's use of the North Fork Wellfield.

MUNI 2-6

Comment noted. See revised FEIS, Volume I, subsections 1.6, 3.3, 4.2, and 4.3.

MUNI 2-7

Please refer to the revised cumulative effects analysis, which includes a review of HCP compliance with the Shoreline Management Act and Sensitive Areas Ordinance, FEIS Volume I, subsection 4.4. The Services anticipate that Tacoma Water would secure all necessary state and local permits prior to implementation of the specifics of any HCM. In the unlikely event of a conflict between local land use permitting and HCM requirements, Tacoma has included contingency planning into its HCMs (e.g., HCM 2-03).

MUNI 2-8

Conservation measures listed in Table 2-11 are designed to offset or compensate for impacts resulting from a Tacoma Water action (Type 1 measure), or consist of contribution of funds and/or implementation of measures designed to offset or compensate for impacts resulting from non-Tacoma actions (Type 2 measure). Implementation of these measures would require Tacoma to obtain permits from appropriate state and federal regulatory bodies.

The final design and implementation procedures for these measures would be developed during the permitting process. Alternate measures would be implemented if any of the measures are determined to be impractical or not cost effective during the final design. Any alternate measure would have habitat benefits greater than or equal to the measure originally proposed, and would be reviewed and approved in advance by the Services. For instance, under HCM 2-09, Mainstem Gravel Nourishment, up to 3,900 cubic yards of gravel would annually be placed downstream of Howard Hanson Dam.

Problematic gravel accumulations would be assessed as part of RFM-03B, Monitor Distribution of Sediments Below Tacoma Headworks. If problematic gravel accumulation in the lower river is identified (as determined by the Services), the rate of placement may be reduced and funds reallocated to other habitat restoration measures.

During final design and permitting of the specific conservation measures, Tacoma and the local permitting agencies may identify the need for additional mitigation. It would be Tacoma's obligation to implement such mitigation in a manner consistent with the HCP.

MUNI 2-9

The Services believe that the DEIS contains impartial and unbiased evaluations of environmental impacts within the HCP area. The federal Habitat Conservation Planning Team relies heavily upon Applicants to provide scientific data to support both the HCP development and the environmental review. However, the federal HCP Team works closely with all Applicants to ensure the NEPA review contains unbiased analyses by incorporating many checks and balances into the HCP review process. For example, each HCP Applicant works exclusively with a team of USFWS and NMFS biologists. This team provides the scientific framework for inclusion into the HCP and for the NEPA evaluation, including appropriate sources for data gathering and parameters for the NEPA impact assessments. The federal biologists then review several drafts of the HCP and DEIS for scientific scrutiny and oversight. The NEPA review is also closely supervised by a USFWS NEPA specialist whose duty it is to safeguard the impartial integrity of the federal environmental review. Finally, the NEPA document is reviewed carefully by regional USFWS and NMFS NEPA and technical staff who are well versed on current scientific literature and local studies.

In regard to the Tacoma Water HCP and DEIS, the HCP was prepared by Tacoma and its consultants. Tacoma staff and its HCP consultants did contribute to the NEPA analysis because of their ongoing working knowledge of resources within the Green River Watershed and their understanding of ESA issues. Additionally, several consultants and federal staff who did not participate in the HCP process were task leaders for the NEPA document. The DEIS was managed by a consultant independent of the HCP process and closely supervised by a federal NEPA specialist. As stated above, the Services are confident that the best available scientific data were used to evaluate impacts under the NEPA review. Furthermore, regardless of the overlap of HCP and NEPA expertise, the analyses are unbiased and impartial because of the careful collaborative and review process described above.

MUNI 2-10

Comments noted and addressed in subsequent responses to specific issues provided by Herrera Environmental.

MUNI 2-11

Comment noted.

MUNI 2-12

Comment noted.

MUNI 2-13

We are unable to fully respond to this comment without specific examples of "pieces of critical information spread throughout the document."

The commenter suggests that flow and wildlife habitat maps and figures be included in the Affected Environment section for improved impact assessment context. Existing Green River flow data were placed into the impact assessment under the No Action Alternative so the reader could more easily compare existing No Action flow conditions with those that would occur under Alternatives B and C (DEIS Figures 4-1a through 4-9b). Because of the complex nature of the flow regime alterations, it was felt the reader would be disadvantaged if the information were in two separate sections of this large document, which would contribute to the commenter's concern regarding "pieces of critical information spread throughout the document."

The commenter also suggests that physiographic province information be included in the Affected Environment for wildlife habitat context. This information was not included as part of the Affected Environment discussion because the parameters for HCP Area wildlife impacts were the Green River Watershed. However, physiographic province information was detailed in the broader cumulative assessment, which analyzed wildlife impacts beyond the watershed parameters. Consequently, province information was more appropriately provided in subsection 4.4, Cumulative Effects, so the reader could compare this information with other data pertinent to the province boundaries.

MUNI 2-14

We are uncertain what specific level of treatment the commenter is requesting for water quality and wildlife resources. However, the Services believe that the water quality and wildlife resource review provided adequate analyses to make an informed determination regarding potential significant impacts to these resources.

As allowed under the Council for Environmental Quality Regulations, some resources receive less review than others depending on several factors, including specifics of the Proposed Action and the potential to significantly impact a resource (40 CFR § 1501.7 (2)(3)). During the EIS scoping process for the proposed HCP, it was determined that Tacoma's plan primarily focuses on the potential to affect fish habitat. For example, Tacoma Water currently implements a Forest Management Plan that provides greater benefits to wildlife resources than state regulations and with the primary purpose of protecting water quality. Since no fish management plan currently exists for proposed water withdrawal activities, fish resources were analyzed to consider new conditions that would occur to that resource if the HCP were implemented. See Specific Comment Response MUNI 2-36 for related information.

MUNI 2-15

See General Comment Response 14 for a discussion of the operation agreement between Tacoma Water and the USACE. Howard Hanson Dam is a federal facility operated by the USACE. The Section 10 ITP being requested by Tacoma cannot cover operation of Howard Hanson Dam; thus, analyzing the impact of the USACE operation of Howard Hanson Dam is not required as part of Tacoma Water's HCP. Coverage under the ESA for operation of Howard Hanson Dam is being pursued by the USACE through the Section 7 ESA process.

Habitat Conservation Measure 2-05, Juvenile Salmonid Transport and Release, provides for the transportation of juvenile salmonids into the upper watershed if such activity is determined to be beneficial to Green River fish runs by the NMFS and USFWS. The transport and release of juvenile salmonids is contingent upon a number of factors, including approval by the Services of the Fish Restoration Facility and its intended uses. If necessary, permits to operate the Fish Restoration Facility, and the release of fish into the upper watershed in compliance with the ESA, would be sought by the Muckleshoot Indian Tribe separate from Tacoma Water's ITP. These actions would undergo NEPA review independent of the HCP. If the fish restoration facility cannot be permitted, or is deemed to be infeasible, the Muckleshoot Indian Tribe will use remaining funds for fisheries enhancement in the Green/Duwamish system. As proposed, quantifying the effects of HCM 2-05 on Green River wild stocks is not required as part of Tacoma Water's HCP impact analyses.

MUNI 2-16

See Specific Comment Response MUNI 2-15.

MUNI 2-17

See General Comment Responses 15, 29, and 30.

MUNI 2-18

The purpose and need of the Proposed Action as stated in subsection 1.2 of the DEIS is to respond to Tacoma Water's permit application in a manner that: 1) provides protection and conservation to listed and proposed species and their habitats to the extent intended under Section 10(a)(1)(b) of the Act, and 2) allows Tacoma Water to fulfill its water supply obligations in a practical manner. The environmental review process must focus on this Proposed Action, the stated purpose and need for the action, and alternatives to the Proposed Action that will fulfill the purpose and need.

Dismissal of an alternative from detailed analysis is therefore justified if it will not accomplish the purpose and need, part of which is to allow Tacoma Water to fulfill its water supply obligations in a practical manner. In this case, an alternative that would unnecessarily and unreasonably affect the quality of Tacoma's municipal water supply is not practical, does not fulfill the Services' purpose and need, and was, therefore, dismissed from detailed analysis.

At this time, no other option has been proposed by the commenter or any other source to develop an HCP for greater wildlife benefits than those that would be realized under the proposed HCP. As detailed in subsection 2.5, Upper Watershed Options Raised during Scoping, potential alternatives would require Tacoma Water to harvest within its designated Natural Zone. Harvesting in the Natural Zone would result in increased water quality and fish habitat impacts as compared to the Proposed HCP, which properly excludes this option from the reasonable range of alternatives. Furthermore, such water quality and fisheries impacts would not meet Tacoma Water's objectives or the purpose and need as stated in paragraph 1 above.

As also described under subsection 2.5, a second HCP alternative would reduce the amount of harvest in the Commercial Zone. However, while a Commercial Zone harvest reduction would provide greater habitat benefits than under the proposed HCP scenario, this would only be a variation of a no-harvest alternative, which has been analyzed in detail as Upper Watershed Alternative C.

MUNI 2-19

A general comparison of flows under Alternative B compared to Alternative A is presented in the referenced table. According to Tacoma Water, additional details of specific flow values were not presented in the summary table due to concerns regarding over-simplification of HCM 1-01, Minimum Instream Flows under First Diversion Water Right claim, and HCM 1-02, Seasonal Restrictions on the Second Diversion Water Right. We agree that additional quantification would be helpful. For instance, under Alternative B, base flows at Auburn during the summer would range from 250 cfs during average years to 300 cfs during wet years. During extreme drought conditions, minimum instream flow at Auburn would not fall below 225 cfs.

MUNI 2-20

We agree that a more accurate statement would be that under Alternative A, large woody debris would continue to be intercepted by Howard Hanson Dam thus preventing the downstream transport of large woody debris to the middle and lower Green River.

MUNI 2-21

This comment references DEIS Table S-1a, but the page reference and specific text passage suggest the comment is intended to address DEIS Table S-1b, which begins on page S-17. The term "road construction, maintenance and use" is used in DEIS Table S-1b in a collective sense to cover all road-management activities. The point being made in the table is that there would be greater attention paid to the protection of water quality during all aspects of road management, including construction, maintenance, and use. Road maintenance can occur for a number of reasons, not all of which relate directly to the protection of water quality. For example, annual grading of road surfaces is a common maintenance practice to facilitate vehicle use of the roads, but if done improperly it can have direct negative impacts on water quality. The HCP includes conservation measures to avoid such impacts.

MUNI 2-22

Comment noted.

MUNI 2-23

Comment noted. See revised FEIS, Volume I, subsection 4.4.

MUNI 2-24

The DEIS was published prior to the bull trout listing change. The threatened status is reflected in the FEIS.

MUNI 2-25

As acknowledged in subsection 4.2.1, Ownership and Land Use, this alternative would require further environmental review if selected as a viable water withdrawal option. The Services and Tacoma Water understand that site-specific analyses would be necessary before Alternative C could be implemented.

MUNI 2-26

See General Comment Response 4.

MUNI 2-27

The commenter questions why the South Tacoma Aquifer wells cannot serve as an independent water supply source in lieu of the sources identified in Tacoma's proposed HCP water supply alternatives. The South Tacoma Aquifer is limited as to the volume of water that can be supplied on an annual basis. However, it is an exceptionally prolific aquifer from the standpoint of rate of supply with wells as large as 6 to 10 mgd being possible. Tacoma utilizes the South Tacoma Aquifer wells as a peaking source due to this high rate of production but limited annual quantity. It is for this reason that the South Tacoma Wells work effectively in conjunction with the Second Diversion Water Right, which is limited as to use due to periods of low instream flows.

MUNI 2-28

Comment noted. This sentence should be read as: "However, this option would <u>not</u> provide certainty that: 1) take is avoided or reduced, or 2) current and future water supply demands could be met." The FEIS has been revised to reflect this change.

MUNI 2-29

The commenter is correct that a description of the impacts of Tacoma water withdrawals from the North Fork Wellfield was not included in DEIS Section 4.0, Environmental Consequences. The following information is provided in response to the comment, and is also included in Volume I, Section 4.0 of the FEIS.

Alternative A

Under Alternative A, Tacoma would continue to withdraw water from the North Fork Wellfield during periods when turbidity in the surface water supply exceeds 5 NTUs. In general, pumping from the North Fork Wellfield would occur during the winter and spring when turbidity and runoff are highest. Based on an analysis of flow records in the 1960s, withdrawals from the North Fork Wellfield would average 85 days per year (see following Table MUNI 2-29).

Table MUNI 2-29. Summary of average daily flow in the North Fork Green River and expected well demand from the North Fork Wellfield by month.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. Daily Flow (cfs)[1]	147	124	92	117	121	73	26	12	24	38	96	169
Days of well use (avg.)[2]	15.2	10	6.2	8.8	11	5.4	0	0	2.6	2.4	10.2	13
Days of well use (range)	4-25	0-28	0-18	0-23	0-20	0-20	0	0	0-13	0-4	7-13	7-19

[1]Mean average daily flow at USGS gauge 12105710 North Fork Green River near Lemolo, WA, for the period July 1965 – September 1982.

[2]Average number of days that well use would be required over a 5-year period in the 1960s, based on the number of days when turbidity exceeded 5 NTUs measured at the Headworks (Noble 1969).

Pumping of groundwater from the North Fork Wellfield would not be expected to affect spawning or incubation of salmon or native char since upstream and downstream fish passage facilities would likely not be constructed. Under ongoing Section 7 consultations, it may be the responsibility of the USACE to provide upstream and downstream fish passage around Howard Hanson Dam; however, federal funding for such fish passage facilities is uncertain. Without Tacoma Water's involvement in the Additional Water Storage Project, the opportunity for funding upstream and downstream fish passage at Howard Hanson Dam may be lost (U.S. Army Corps of Engineers 1998).

In the absence of a downstream fish passage facility at Howard Hanson Dam, it is uncertain whether the introduction of hatchery-origin, juvenile anadromous salmonids on an experimental basis would continue. If juvenile salmonids were planted in the upper watershed, pumping of the North Fork Wellfield would be expected to affect rearing conditions, depending on life history characteristics of the species. Pumping of groundwater from the North Fork Wellfield is expected to have little effect on chinook rearing in the North Fork Green River since wellfield pumping primarily occurs during late fall, winter and early spring high flow periods. Researchers from the USFWS observed an abundance of chinook rearing sites in the lower North Fork, but noted that chinook appeared to

use the North Fork for short-term rearing and as a transportation corridor (Wunderlich and Toal 1992). Use of the North Fork by juvenile chinook appeared to be completed by early July when flows naturally begin to decrease.

The observed movement of chinook fry out of the North Fork channel by early July is consistent with an ocean-type early life history where chinook fry migrate to the estuary within 30 to 90 days of emergence (see HCP Appendix A). Although USFWS researchers observed chinook fry moving out of the North Fork channel by early July, the proportion of chinook juveniles migrating as newly emerged fry, fingerlings or yearlings may change if a naturally reproducing stock is reestablished in the upper watershed.

Pumping from the North Fork Wellfield during the summer and early fall, though rare, would be expected to have a negative effect on coho, steelhead, and yearling chinook salmon rearing habitat in the North Fork. Pumping of the North Fork Wellfield during May and June would potentially reduce available steelhead spawning habitat and increase incubation mortality of steelhead eggs; however, little impact to steelhead spawning and incubation would be expected if pumping occurred during periods of high spring runoff.

Alternative B

Under Alternative B, upstream and downstream fish passage facilities would be constructed at Howard Hanson Dam and Tacoma Water's Headworks providing the opportunity to restore naturally reproducing populations of anadromous fish to the upper watershed. These populations would be exposed to the effects of Tacoma Water's use of the North Fork Wellfield during periods of turbid surface water supplies. Tacoma's use of the North Fork Wellfield may pose the greatest risk to instream resources during the late summer and early fall. If pumping from the wellfield was to occur without a storm-related rise in streamflow, adult and juvenile salmonids holding in the lower North Fork channel could be exposed to channel dewatering. Groundwater outflow below the wellfield maintains cool water temperatures and provides potentially important adult holding and rearing habitat for salmonids. If pumping from the North Fork Wellfield during the late summer interrupts the outflow of groundwater and reduces flow into the channel, fish holding in the lower North Fork could be trapped in isolated pools or be forced to move downstream to the reservoir.

Under Alternative B, pumping from the North Fork Wellfield would be restricted to periods when the turbidity of Green River surface water supplies approach 5 NTUs, unless emergency conditions

require use of the North Fork aquifer in lieu of surface water. During the period 1 July through 31 October, should turbidity of the mainstem Green River approach 5 NTUs, Tacoma would begin pumping from the North Fork Wellfield at a rate that maintains a maximum pumping-related stage drop of no greater than 1 inch per hour in the lower North Fork channel at an area of potential salmonid holding refugia to be determined in coordination with the NMFS and USFWS. Restricting withdrawals from the North Fork Wellfield to periods when the turbidity of the mainstem Green River approaches 5 NTUs reduces the risk of impact to instream resources in the lower North Fork to those periods when water withdrawals are needed to avoid violation of Primary Drinking Water Standards. Restricting the pumping of water from the North Fork Wellfield to a rate that maintains a pumping-related stage reduction of no greater than 1 inch per hour in the lower North Fork channel during the period 1 July though 31 October helps ensure that fish holding in the lower North Fork channel would have the opportunity to move downstream to the reservoir and potentially avoid becoming stranded by pumping-related reductions in stage.

Alternative C

Under Alternative C, upstream and downstream fish passage facilities would be constructed at Howard Hanson Dam and Tacoma Water's Headworks providing the opportunity to restore naturally reproducing populations of anadromous fish to the upper watershed. These populations would be exposed to the effects of Tacoma Water's use of the North Fork Wellfield during periods of turbid surface water supplies. Under Alternative C, use of the North Fork Wellfield would occur as often as under Alternative A, but the quantity of water to be withdrawn from the North Fork Wellfield would be reduced relative to Alternative A.

Surface water withdrawn from the mainstem Green River at RM 29.2 would be filtered to meet water quality standards and would not need to meet quality standards of less than 5 NTUs. Water supplied to customers upstream of McMillin Reservoir and withdrawn at Tacoma's Headworks at RM 61.5 would still depend on water supplies of less than 5 NTUs, and would depend on the North Fork Wellfield as a water source during periods of surface water turbidity. About 15 cfs of water would be required to satisfy water supply customers upstream of McMillin Reservoir; this represents between 7 and 13 percent of the total volume available under the First Diversion Water Right claim and Second Diversion Water Right. The physical impact of water withdrawals on potential salmonid habitat in the North Fork channel would thus be much reduced compared to Alternative A.

MUNI 2-30

Tacoma Water manages its lands in the Upper Green River Watershed to protect water quality. Where commercial timber harvest does not conflict with that objective, Tacoma Water harvests timber and uses the resulting revenues to fund additional land acquisitions and implement fish and wildlife conservation measures. Water quality is protected during timber harvesting by: 1) designating all lands adjacent to surface waters as no-harvest Natural Zone or riparian buffers; 2) using appropriate felling, yarding, and site preparation techniques to minimize soil disturbance, compaction, and erosion; 3) maintaining appropriate drainage and surface conditions on all roads; and 4) ceasing harvesting and hauling operations when weather conditions (e.g., rain) warrant. Continued monitoring by Tacoma Water as part of its watershed management activities will ensure that water quality is maintained.

The HCP and DEIS are not intended to serve as detailed comparisons of the effects of various timber management regimes on water quality. Rather, they have incorporated (and improved upon) state-of-the-art methods for protecting water quality and fish habitat during timber harvest and hauling. The riparian buffering and road management measures in the HCP exceed the standards of the recently adopted Washington Forests and Fish Report, which is considered by the Services, the EPA, and Ecology as sufficient to maintain and improve water quality on commercial timberlands.

MUNI 2-31

The three upper watershed management alternatives analyzed in the DEIS cover the full range of habitat conservation, from the minimum required under current Washington Forest Practices Rules (Alternative A), to complete prohibition on commercial timber harvesting (Alternative C). Identification of an alternative that would provide more habitat benefits than Alternatives A, B, and C was difficult because complete dedication of Tacoma Water lands to natural reserves (Alternative C) is considered by many to be the best option for providing wildlife habitat in the long term. The only possible way to provide more wildlife habitat than Alternative C would be to actively manage habitat in the short term to accelerate the development of late-seral coniferous forest conditions. Active habitat management would already occur in the Conservation Zone under Alternative B, so it would be necessary to extend it to the Natural Zone to provide more benefit than Alternative B. This is the basis for the alternative discussed in DEIS subsection 2.5.1, and the reason why timber harvesting was identified as necessary under such an alternative.

The discussion in DEIS subsection 2.5.1 does not state that clearcutting would be the only option for improving habitat in the Natural Zone. The DEIS simply summarizes the proposed management of the Conservation Zone and suggests that similar management would be needed in the Natural Zone if the objective were to improve wildlife habitat in the short term. Clearcutting to convert hardwood stands to conifers is one (but not the only) management tool that would likely occur under the new alternative. Selective harvesting would also occur, as described in DEIS subsection 2.5.1.

The Natural Zone designation was originally developed by Tacoma Water to protect surface water quality from commercial timber harvesting and other management activities. Harvesting in the zone would require the construction and maintenance of additional roads, and result in the removal of trees from the floodplain of the Green River. Tacoma Water is not convinced that adherence to DNR riparian buffers alone would be sufficient to completely avoid water quality impacts associated with logging in the Natural Zone. A number of small habitat improvement projects are planned for the Natural Zone as part of the mitigation for the USACE Additional Water Supply Project, but Tacoma Water is not willing to risk the deterioration of water quality by conducting additional activities. Consequently, the Services did not consider this alternative worthy of detailed analysis.

MUNI 2-32

Bull trout and Dolly Varden were previously considered to be the same species, but were recognized as separate species by the American Fisheries Society in 1980 based upon differences in morphometrics, osteological features, and embryological development (Cavender 1978). These two native char species are difficult to differentiate based upon overall physical appearance, but can be identified to species using morphological-meristic (measurements of physical features) and genetic analysis (64 FR 58910). Both species of native char have similar life history traits and habitat requirements (Washington Department of Fish and Wildlife 1998; 64 FR 58910). Dolly Varden are not obligate anadromous spawners, and bull trout may express resident, adfluvial, or anadromous life history forms (63 FR 31693).

Because bull trout and Dolly Varden are difficult to distinguish based upon physical appearance, and have very similar biological characteristics, WDFW manages and regulates these as the same species (Washington Department of Fish and Wildlife 1998). WDFW refers to bull trout and Dolly Varden as “native char” in managing and protecting these species. Tacoma’s HCP seeks coverage for both species under the ITP. Following WDFW’s convention, both species are described and analyzed

as the same species throughout the HCP, and are jointly referred to as "native char" or "bull trout" in the document. The USFWS does not believe that significant differences exist between bull trout and Dolly Varden that would justify separate effects analyses in our Biological Opinion or the development of species-specific conservation measures in the HCP.

MUNI 2-33

There is little information available specific to the status of Green River native char (Washington Department of Fish and Wildlife 1998). A detailed description of survey results conducted as of December 1999 is provided in HCP Appendix A, Bull Trout and Dolly Varden, Known Occurrences in the Project Vicinity.

MUNI 2-34

The referenced statement regarding detrimental effects of flood flows is provided as a discussion of hydrology and peak flows in DEIS subsection 3.8.2.2, Current Fish Habitat Conditions, Upper Green River Watershed. Reference to the benefits of providing the full range of natural flow variations can be found in the DEIS subsection 3.8.2.2, Current Fish Habitat Conditions, Lower and Middle Watershed. The discussion of hydrology in HCP subsection 4.1.4.1, Surface Water Hydrology, describes the statistical analysis of flows used as one tool to evaluate the effect of Howard Hanson Dam and Tacoma's water withdrawals on flows in the Middle and Lower Green River Watershed. While admittedly a complex issue, peak flows can have both beneficial and detrimental effects.

MUNI 2-35

See General Comment Response 22.

MUNI 2-36

The need for detailed analysis of Covered Wildlife Species (existing conditions and impacts) is precluded by the fact that the Tacoma Water HCP takes an extremely conservative approach to wildlife mitigation. The level of incidental take is expected to be quite small because of the low level of habitat alteration that would occur (i.e., harvesting of fewer than 80 acres per year). Conversely, the level of mitigation would be high and would include: 1) dedication of roughly 74 percent of the Covered Lands to habitat reserves; 2) riparian buffers roughly twice the size of those recommended by the Washington Forests and Fish Report; 3) green tree, snag, and log retention

standards more than twice the level required under Washington Forest Practices Rules; 4) timber harvest rotations that are at least 50 percent longer than the standard on state and private lands in Washington; and 5) species-specific measures to protect nests, dens, and foraging areas of Covered Species that are particularly sensitive to human activity. The level of detail in the analysis of Covered Wildlife Species does not match the level of analysis for Covered Fish Species, but in both cases the level of analysis is appropriate to the level of risk associated with issuance of the ITP and implementation of the HCP.

A maximum of 80 acres of potential olive-sided flycatcher habitat would be altered in any year under the HCP, and in most years it would be considerably less. As mitigation, Tacoma Water would maintain more than half the Covered Lands (at least 7,000 acres) in permanent forest cover in the Natural Zone, Conservation Zone, and habitat reserves in the Commercial Zone. A more detailed analysis of impacts to the olive-sided flycatcher might be academically interesting, but it would not lead to the conclusion that the HCP, as proposed, fails to meet the ITP issuance criteria of ESA Section 10.

MUNI 2-37

As discussed in DEIS subsection 4.2.5, the flow regime proposed in the HCP would have no effect on riparian vegetation along the Green River.

MUNI 2-38

See Specific Comment Response MUNI 2-36.

MUNI 2-39

See General Comment Response 30.

MUNI 2-40

A summary comparison of the effects of each alternative on water quality was presented in DEIS subsection 4.2.4, Environmental Consequences, Water Withdrawal Alternatives, Surface Water Quality and Quantity. Additional details on the effects of each alternative on water quality were incorporated into the discussion of fish habitat presented for each alternative in FEIS subsections 4.2.6.1, No Action; 4.2.6.2, Proposed Action; and 4.2.6.3, New Diversion.

MUNI 2-41

Comment noted. The title for Figure 4-8a should be read as: "Flows in Green River, Washington at Auburn under Alternative C, dry year conditions (1994)." The FEIS has been revised to reflect this change.

MUNI 2-42

Table 4-7 is correctly placed in the document on Page 4-92. It is possible that a printer error may have occurred in the document received by the commenter.

MUNI 2-43

Build-up of forest fuels (dead trees, logs, and slash) on Tacoma Water lands could be greater under Alternative C than under Alternatives A and B, but the overall risk of catastrophic forest fire would not increase appreciably. Few fires are likely to originate on Tacoma Water lands, regardless of fuel levels, because public access is restricted. Lightning and timber harvest activities present the primary risks of fire, but the intensive watershed patrolling by Tacoma Water would continue to result in the quick location and suppression of fires. The risk of fire would only increase substantially if extensive road closures prevented Tacoma Water from patrolling the watershed effectively.

MUNI 2-44

The planned release of springtime freshets at Howard Hanson Dam is intended to supplement, rather than replace, natural freshets. Depending on runoff characteristics, storage of water behind Howard Hanson Dam will reduce flows in the Middle and Lower Green River by 5 to 15 percent. The natural variation in flow, including freshets, will still occur, but medium and high flow conditions will be reduced in magnitude from natural conditions. The number of freshets occurring each spring in the Green River will be determined by natural flow variations, and supplemented by the planned release of freshets if determined to be beneficial to aquatic resources.

The magnitude, timing, duration, and frequency of short-term releases of high flows from Howard Hanson Dam will be based on recommendations of the Green River Flow Management Committee. Short-term releases of high flows are expected to help speed the downstream movement of juvenile salmonids migrating to the estuary and may improve instream survival. The release of freshets may also increase the risk of trapping and stranding of juvenile salmonids in isolated pools along the river margins. Planned release of freshets may also induce adult steelhead to spawn along the river

margins where redds may be susceptible to dewatering following the freshet. The determination of whether the release of artificial freshets is a net benefit to Green River aquatic resources would be based, in part, on the results of research monitoring efforts as described in HCP Chapter 6.

MUNI 2-45

The planned release of freshets of a volume of 2,500 cfs for 38 hours was based on an analysis of water particle travel time conducted by the USACE for the Additional Water Storage Project (U.S. Army Corps of Engineers 1998). During periods of spring drought, the freshet volume may be reduced to a doubling of background flows, and may be as low as 1,200 cfs. As indicated in the previous response, the magnitude, timing, duration, and frequency of short-term releases of high flows from Howard Hanson Dam will be based on recommendations of the Green River Flow Management Committee.

MUNI 2-46

Comment noted. The magnitude, timing, duration, and frequency of short-term releases of high flows from Howard Hanson Dam will be based on recommendations of the Green River Flow Management Committee.

MUNI 2-47

The DEIS discloses the environmental impacts of the alternatives to the extent possible, given the nature of the alternatives. This is consistent with the requirements of NEPA to support a full comparison of direct and indirect impacts. Certain aspects of the alternatives can be described in detail, such as flow regimes under the various withdrawal alternatives. When detailed information is available, detailed analyses have been provided in the DEIS. However, when the Services cannot reasonably or accurately predict the activities that would occur under an alternative, the level of detail in the impact assessment is less.

The analysis of road abandonment under Upper Watershed Alternative C is a good example of an appropriate level of detail. The alternative would likely result in the abandonment of forest roads in the upper watershed, but the locations and conditions of those roads would not be determined until the completion of Watershed Analyses and evaluation of Tacoma Water's transportation needs under that specific alternative. Any attempt to discuss sediment production associated with road abandonment at this time would be speculative. Detailed analysis is not necessary because it is

generally accepted that the long-term benefits of road abandonment outweigh the short-term impacts. Any road abandonment done by Tacoma Water would have to be done in accordance with Washington Forest Practices Rules, and any work within the highwater mark of surface waters (e.g., culvert removal) would require Hydraulics Project Approvals from the WDFW. These two state regulatory processes would ensure that short-term impacts to water quality are minimized.

MUNI 2-48

Studies have shown that the existing supply of gravel within the mainstem river is being influenced by the operation of Howard Hanson Dam, resulting in changes in channel morphology and in bed armoring that impacts salmonid spawning (Perkins 1993; Dunne and Dietrich 1978). Howard Hanson Dam essentially captures all gravel that may be recruited from the upper watershed, thereby precluding the natural replenishment of spawning gravel to segments of the river below the dam.

Over time, this will ultimately result in the gradual degradation of suitable spawning habitats in the mainstem river, thereby reducing production of naturally spawning salmon and steelhead. As noted in HCM 2-09, Mainstem Gravel Nourishment, the gravel nourishment program is intended to slow or stop the downstream extension of streambed armoring and to replenish certain areas currently deficient in spawning-sized sediments. Alternate measures would be implemented if the measure is determined to be infeasible or not cost effective during the final design or if environmentally superior measures can be implemented at comparable cost. Any alternate measures would have habitat benefits greater than or equal to the measure originally proposed, and would be reviewed and approved in advance by NMFS and USFWS.

MUNI 2-49

A small percentage of adult salmon and steelhead transported above Howard Hanson Dam may fall back through the project and could spawn in the reach between Howard Hanson Dam and Tacoma's Headworks. The location of gravel nourishment sites would be determined in coordination with the Muckleshoot Indian Tribe, other federal agencies, City of Tacoma, and state and local agencies with jurisdiction.

MUNI 2-50

Summaries of the predicted increases and decreases in habitat types and survival indices of each alternative are presented in the DEIS Table 4-2, Chinook Salmon; Table 4-3, Coho Salmon; Table 4-4, Chum Salmon; and Table 4-5, Steelhead Trout.

MUNI 2-51

The discussions of general impacts to wildlife populations under Water Withdrawal Alternatives B and C (DEIS subsections 4.2.7.2 and 4.2.7.3, respectively) are accurate as presented. While there are minor differences in impacts to habitat (as noted), the overall effects of the two alternatives at the population level are nearly identical. The two subsections use identical wording because they describe identical situations. The Services know of no requirement under NEPA to compose unique text to describe two sets of similar impacts.

See Specific Comment Response MUNI 2-47. As noted in that earlier comment response, quantification of road abandonment rates under the three upper watershed management alternatives is neither possible nor necessary.

MUNI 2-52

See Specific Comment Response MUNI 2-47. As noted in that earlier comment response, quantification of road abandonment rates under the three upper watershed management alternatives is neither possible nor necessary.

MUNI 2-53

Comment noted regarding job impacts. See revised FEIS, Volume I, subsection 4.3.10, Social and Economic Conditions.

Regarding the table in subsection 4.3.10, the Services do not believe that a cost breakdown will enhance the impacts analyses since there is not a substantial difference between Alternative A and B annual upper watershed management costs. Costs under Alternative C are easily attributed to cessation of timber harvest activities in the upper watershed; therefore, a breakdown is unnecessary to understand the potential economic effects associated with this alternative.

MUNI 2-54

See Specific Comment Response MUNI 2-13. The descriptions of physiographic provinces, land types, and management strategies were provided as the parameters for the cumulative assessment, which is a broader assessment than the Green River Watershed review analyzed under the Environmental Consequences section. Providing this information earlier in the document under Section 3.0 would not have contributed to the general impact analyses because it is outside of the Covered Lands parameters. See subsection 4.4.1, Scope of Analysis – Geographic.

MUNI 2-55

See Specific Comment Response MUNI 2-14.

MUNI 2-56

See Specific Comment Response MUNI 2-16.

MUNI 2-57

Research funds described in the HCP are estimates based on the best available information and, depending on the specific commitment, may be an overestimate or underestimate of what will eventually be needed. To address this issue, Tacoma with approval of the Services has the ability to transfer funds between measures to address changes in research needs or priorities while maintaining control over the project costs.

MUNI 2-58

As noted in HCM 2-03, the final design of the measures would be developed during the pre-construction engineering and design phase of the Howard Hanson Dam Additional Water Storage Project. Large woody debris frequency and size requirements appropriate for the channel type would be determined using habitat criteria such as those recommended by the Washington Watershed Analysis Manual (Washington Forest Practices Board 1997) or comparable systems approved by the Services. Alternate measures would be implemented if any of the above measures are determined to be infeasible or not cost effective during the final design or if environmentally superior measures can be implemented at comparable cost. Any alternate measures would have habitat benefits greater than or equal to the measure originally proposed, and would be reviewed and approved in advance by NMFS and USFWS.

MUNI 2-59

Comment noted.

MUNI 2-60

Comment noted.

MUNI 2-61

As noted in the HCP, quantitative analyses were conducted for species where sufficient data are available to justify species-specific differences. For instance, juvenile native char have not been observed in the Green River basin, yet analyses of anticipated impacts under each alternative were conducted using the results of analyses conducted for other species as surrogates, or indicators of the effects on native char.

Analyses conducted for the Tacoma Water HCP quantified changes in potential habitat or indices of survival to evaluate the impacts and benefits of covered activities and conservation measures. Predicting resultant changes in the numbers of fish is beyond the intent of quantitative models, such as the USFWS IFIM, that were used to evaluate impacts and benefits of the Alternatives.

Comment Responses to King County Department of Development and Environmental Services (MUNI 3)

MUNI 3-1

The analyses of juvenile chinook outmigration in Tacoma Water's HCP assumed that downstream movement of subyearling fry would occur mid-March through June. Under the Additional Water Storage Project, water storage at Howard Hanson Dam will not begin until mid-February and will be limited to a maximum storage of 5,000 acre-feet by 1 March. Thus, the primary period of water storage under the Additional Water Storage Project will occur during March, April, and May. Any juvenile salmonids moving downstream during January and the first half of February (i.e., before the start of reservoir storage) will be unaffected by water storage under Tacoma's Second Diversion Water Right. Changing the outmigration analyses to reflect periodicity of downstream fry movement beginning in January would reduce the effect of water storage and withdrawals on March-through-May juvenile salmonid outmigrants. Assuming that the majority of the downstream movement of subyearling chinook coincides with the primary period of spring water storage could be considered a worst-case analysis of the effects of water withdrawal.

The analyses of the effects of Tacoma Water's exercise of its First Diversion Water Right claim and Second Diversion Water Right on juvenile salmonid outmigration were developed to provide an index of the effect of Tacoma's withdrawals on juvenile salmon migration. The periodicity of downstream salmonid movement was intended to reflect a generalized spring outmigration period that coincided with peak water storage. Annual variations in the timing of downstream movement of subyearling chinook are expected. Subyearling chinook have been observed in the Middle Green River as early as January during juvenile salmonid surveys funded by Tacoma Water and the USACE (Jeanes and Hilgert 1999). In the future, these data will be combined with the results of the WDFW trapping efforts to refine the outmigration model. Analyses will be refined after several years of outmigration surveys and the results can be used by the Green River Flow Management Committee to adjust the rate of springtime storage and release to minimize the detrimental effects of water storage and withdrawal.

MUNI 3-2

As stated in the supporting description of HCM 1-03: "The proposed facility includes a fish ladder over the Tacoma Headworks combined with a trap-and-haul program from the Headworks to above Howard Hanson Dam." Although the text referenced by the commenter is accurate, it will be modified to avoid confusion.

MUNI 3-3

Although fish passing downstream over Tacoma Water's Headworks are believed to incur little injury or mortality during their transit over the existing spillway, some potential for injury does exist. The existing concrete gravity diversion dam is 17 feet high. In general, mortality of juvenile fish passing over dams is a function of the height of the structure, the maximum velocity of water (which is primarily dependent on dam height), and the configuration of the channel immediately downstream of the dam. For small fish (<100 mm), mortality is near zero, even for falls of over 100 feet, provided they land in water. Larger fish (>300 mm) begin to experience mortality at falls greater than 50 feet. Fish mortality is also influenced by the maximum velocity of the flow passing over a dam. Where flows passing over a dam empty into a deep pool or stilling basin, mortality is essentially zero at velocities less than 40 feet per second (fps); however, shallow flow or obstructions such as exposed rocks below the spillway appear to increase the rate of mortality and injury (R2 Resource Consultants 1998).

Although there are no site-specific data on the hydraulic conditions or injury or mortality of fish at the existing Tacoma Headworks diversion dam, information from studies at other projects suggest that the rate of mortality experienced by juvenile fish passing over a 17-foot spillway is probably low. Smolts passing through the radial gates at Howard Hanson Dam drop 26 feet onto a concrete slab with no apparent injury (Seiler and Neuhauser 1985). However, because the channel configuration downstream of the Headworks diversion dam currently consists of a shallow concrete apron, it must be assumed that there could be some injury or mortality of juvenile and adult salmonids passing downstream over the Tacoma Headworks under its current configuration at some flows.

Reconstruction of the Headworks as part of the Second Supply Project will raise the diversion by 6.5 feet to a total height of 23.5 feet. As part of HCM 1-03, Tacoma Headworks Upstream Fish Passage Facility, and HCM 1-04, Tacoma Headworks Downstream Fish Bypass facility, Tacoma

Water would rebuild its Headworks facility and reconfigure the channel below the Headworks to minimize potential injury associated with downstream passage of salmonids over the Headworks spillway.

MUNI 3-4

The NMFS consider chinook salmon in the Green River to exhibit an ocean-type (subyearling) juvenile life history (Myers et al. 1998). Although some populations in the Puget Sound Evolutionarily Significant Unit (ESU) have a high proportion of yearling smolt emigrants, the proportion varies substantially from year to year and appears to be environmentally mediated rather than genetically determined (Myers et al. 1998). Tacoma Water's HCP recognized this potential variation in life history pattern and noted that both yearling and subyearling migrants have been observed in recent Green River studies (see HCP Appendix A, Chinook Salmon Life History and Habitat Requirements). Accordingly, we do not believe a separate assessment of spring chinook restoration is required.

Comment Responses to King County Water and Land Resources Division (MUNI 4)

MUNI 4-1

See General Comment Response 31.

MUNI 4-2

Comment noted.

MUNI 4-3

Comment noted.

MUNI 4-4

Comment noted.

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

Dear Mr. Romanski:

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS)

1 Please require the utmost effort by Tacoma to save wild chinook salmon runs on the Green River. I want you to ensure that Tacoma's HCP guarantees the restoration of these and other salmon and steelhead runs and other species as well.

2 The HCP should end logging on Tacoma's lands to help heal the watershed. Forests help fish by keeping fine sediments out of the rivers. Trees help provide slow, steady return flows to the river and streams after rain and snow. They shade the streams to keep the water cold, they provide habitat
3 for all potential threatened species. Tacoma should be required to buy additional lands to help restore the watershed.

4 The HCP should keep flows in the river as natural as possible, including natural high flows which are important to fish. A lot of water must be in the
5 river to lessen the effects of pollution & help keep the water cool for salmon.

6 The HCP must not allow additional water storage at the Corps of Engineers' dam. The juvenile salmon cannot find their way through the reservoir and need less water storage, not more. The two dams impact salmon by not permitting upstream passage at all. Tacoma should be required to build fish
7 ladders around them. Fish should not be trucked around them.

8 The HCP must require full restoration of the natural movement of gravel and sediment downstream which is now impaired by the dams. Spawning habitat
9 below and above the dams must be restored. Tacoma must also restore the large woody debris that occured naturally in the watershed.

10 The HCP must require that Conservation and Re-Use of water is the method for restoring the river.

11 The HCP must mitigate Recreational losses from Tacoma's use of the River.

12 Please consider these comments to include by adoption and incorporation by reference the Comment Letter for the HCP written by Sierra Club, Cascade Chapter

John Beal, president,
Green Duwamish Watershed Alliance
742 S. Southern St.
Seattle WA 98108

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

Dear Mr. Romanski:

RE: Tacoma's Habitat Conservation Plan (HCP) for its Lands & Operations in the Green River Watershed & Related Environmental Impact Statement (EIS)

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9 large woody debris that occured naturally in the watershed.

10 The HCP must require that Conservation and Re-Use of water is the method for restoring the river.

11 The HCP must mitigate Recreational losses from Tacoma's use of the River.

12 Friends of the Green River thanks you for this opportunity to comment. Having read the comment letter of Sierra Club, Cascade Chapter, we wish to incorporate by reference their letter minus anything related to Pipeline 5. Friends of the Green River has an agreement with Tacoma re-

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18605 106th Place, SE
Renton, WA 98055

March 8, 2000

Tim Romanski
Project Biologist
Fish and Wildlife Service
510 Desmond Drive, SE
Suite 102
Lacey, Washington 98503-1263

Mike Grady
Project Biologist
National Marine Fisheries Service
510 Desmond Drive, SE
Suite 103
Lacey, Washington 98503-1263

Reference: City of Tacoma's Habitat Conservation Plan for Green River Watershed

Dear Messrs. Romanski and Grady:

1 We have reviewed the referenced Habitat Conservation Plan and the Services' Draft Environmental Impact Statement. Overall, with one exception, we are pleased with the documents and generally support the proposed action alternative (Alternative B).

2 Tacoma has done a good job of pulling together the very complex planning that has been accomplished in the interest of further use of the Green River for water supply, and in pursuit of salmon and steelhead recovery.

3 As our representative shared at the February 29 public meeting, we do take issue with that element of your proposal calling for the transfer by trucks of large woody debris from behind Howard Hanson Dam to random release below the Tacoma Headworks dam. The transferred debris would then be transported during high water events down the middle Green River, into the lower Green, and perhaps eventually reaching Elliott Bay. We view your proposal as an uncontrolled experiment, one that has evidently not received a lot of thought. Where else has something like this been tried? If anything comparable to the Green River large woody debris transfer has been done and documented through scientific monitoring, please provide us a copy of such documentation.

While we are strong proponents of fish habitat restoration, through the proper placement of woody debris at strategic locations in a stream, we believe that each system needs to be evaluated and planned for this treatment on its own merit. Trying to restore the river to "natural" conditions is commendable. We understand why fish biologists would propose this.

4 Fred Goetz, Corps of Engineers fish biologist, was very eloquent in his arguments for the transfer of woody debris at the February 29 meeting. However, we don't believe that the Corps of Engineers is ready to change the flood control operation of Hanson Dam to allow the extreme winter flows below to reach the levels obtained prior to that project. The pre-dam high discharge flows provided the medium for moving large woody debris down through the system and adjusting the log jamis that now occur in segments of the lower middle Green. Trying to get the same placement density of large woody debris as may have occurred prior to the dam does not make much sense when the flow regime has been changed so much. Mr. Goetz cited the Nisqually River as a model for large woody debris distribution. Strange that the Nisqually chum and steelhead runs have crashed whereas the Green River enjoys healthy runs of both species and wild Chinook.

5 The documents are inadequate in their discussion of the woody debris proposal and specifically the adverse and even deadly possible impacts on heavy recreational use of the middle river by whitewater rafters, kyakers, inner tubers, drift boat fisherman and others. With the regulation by Hanson dam the public has come to enjoy throughout the year the river in a wide-range of activities. Public use grows annually. Even under present conditions, the river can be hazardous. Lives have been lost and boats have been sunk. The lower middle section, below Whitney Bridge, already has a great deal of woody debris; enough to challenge boaters under certain conditions of water flow.

6 You should be aware of the very heavy use of the lower portion of the Green River by tribal and non-tribal drift boat fishers, throughout most of the year. Within the last several years there have been at least four drift boat sinkings due to encounters with large woody debris. Every March our chapter joins the Muckleshoot Indian Tribe, Washington Department of Fish and Wildlife, and the Green River Trout Club in a wild steelhead brood stock capture program that relies on the use of drift boats in the middle Green River. We have enough difficulties navigating the plentiful large woody debris already in place. More large woody debris could block use of the lower Middle River and adversely impact the long-term wild steelhead recovery program for the upper watershed above Hanson Dam. A major large woody debris blockage now exists in the Green River below Highway 18 that precludes safe passage by boaters to the Auburn and Kent.

7 We ask that Tacoma, and your agencies reassess the large woody debris transfer proposal and look at locations that lend themselves to secured placement where the wood can provide valuable fish benefits. The release of large quantities of uncontrolled large woody debris is incongruent with the river as it exists today and with the intensive public use of the stream. Your proposal could result in the river being placed off limits to public use.

8 Before further action is taken on woody debris placement we ask that a stakeholder group be established by Tacoma to discuss the woody debris transfer concept and work out acceptable alternatives. The proposal set forth in your report is not acceptable and, if implemented, could result in lawsuits if anyone is injured or killed. We don't believe the City of Tacoma or the congressional delegation wants to be part of something like that or the negative media attention that would result.

9 We would be pleased to have a representative on a woody debris stakeholder committee as described above. I can be reached at (425) 277-3942.

Thank you for this opportunity to comment on your documents.

Sincerely,

Robert Larsen V.P.
for

Joseph Madrano
President

Cf. Representative Adam Smith
Representative Jennifer Dunn
Representative Norm Dicks
Senator Slade Gorton
Senator Patty Murray

APR 3 2000
N60.4

Rainier Audubon Society * PO Box 778 * Auburn, WA 98071
http://rainier.wa.audubon.org

March 29, 2000

Tim Romanski
U.S. Fish and Wildlife Service
Habitat Conservation Plan Program
510 Desmond Drive, S.E., Suite 102
Lacey, Washington 98503

Dear Mr. Romanski:

The Rainier Audubon Society appreciates the opportunity to comment on the city of Tacoma's proposed Habitat Conservation Plan for its 15,000 acres within the Green River watershed in south King County.

Our general concern with HCP's is that their 50-year duration, with no reopener clauses, increases extinction risk for threatened and endangered species. Our specific concerns with the proposed HCP centers on proposed commercial logging, and on forest management deficiencies that would result in inadequate species protection.

1 It is our conclusion that the HCP does not meet the Endangered Species Act's Section 10 requirements, or the standards implementing the "no surprises" policy. We ask the U.S. Fish and Wildlife Service and National Marine Fisheries Service to withhold incidental take permits until the deficiencies can be corrected and compliance with the Endangered Species Act achieved. The following deficiencies are noted:

1. The plan fails to mitigate take to the maximum extent practicable.
2. The plan does not quantify biological goals and objectives
3. The plan does not comply with the requirement that management actions must not appreciably diminish chances of recovery.

Deficiency One
We are not convinced that plans for commercial logging mitigate take to the maximum extent practicable. We are especially concerned with the logging proposal because of the habitat that will be lost to the Additional Water Storage Project.

2 Choosing the no-logging alternative would have environmental benefits for the Green River watershed that would be superior to those of the proposed alternative. As the draft environmental impact statement points out, sediment input to surface waters in the no-logging alternative would be reduced compared to the proposed alternative, due to the absence of soil disturbance and new road construction related to timber harvest. Also, there would be increased spawning and rearing habitat benefits for anadromous fish.

3 There are better alternatives to commercial logging. We urge the city to work with Rep. Dicks and other members of the Washington congressional delegation to seek support from the Land and Water Conservation Fund for the land purchases commercial logging would fund. Another alternative is to finance land purchases from water rates. Commercial logging would raise an estimated $600,000 per year, which translates into $7 per customer each year. For less than 60 cents per customer each month, the city could raise the necessary funds for land purchases and forego commercial logging. The city has not presented convincing evidence that increasing water bills by this nominal amount would be "impracticable."

4 The city of Seattle has agreed to manage the Cedar River watershed without commercial logging. We believe the city of Tacoma should provide the same level of protection for the Green.

Deficiency Two
5 The lack of measurable objectives is also troubling. Narrative objectives would invite endless disputes about their meaning, and moreover, do not provide meaningful benchmarks to determine whether habitat conditions sufficient to ensure species recovery are being achieved.

Deficiency Three
6 The plan states that in the Natural Zone, danger trees that are felled "may" be left on the ground. It also states that harvest may be permitted "to improve habitat for one or more fish or wildlife species." The language in both instances is unacceptably vague.

7 For the Natural Zone to truly achieve its objective of succession to late seral stages, it is vital that dead and downed wood be left to enrich the soil, provide nutrients and nurse logs for new forest growth, and habitat for wildlife that depend on dead and downed wood. The plan must spell out the criteria under which "danger" trees would be harvested, and in which harvest would be permitted "to improve habitat for one or more fish or wildlife species."

8 Furthermore, the plan would not provide enough down wood for pileated woodpeckers, protection of old-growth forage habitat for Pacific fishers and northern goshawks, or year-round protection of occupied marbled murrelet habitat. It should be noted that Simpson Timber Co.'s HCP retains all occupied murrelet habitat. The city of Tacoma should do no less.

9 As a result of these deficiencies, we do not believe that the HCP meets the fundamental purpose of the Endangered Species Act, to conserve threatened and endangered species and the ecosystems upon which they depend. Accordingly, we request the FWS and NMFS to withhold incidental take permits until the deficiencies are corrected and the plan can achieve compliance with the Endangered Species Act.

Other points we wish to raise:

10 Water Efficiency: The city of Tacoma has taken noteworthy steps to improve water efficiency. However, we believe that more aggressive efficiency and reuse measures must be taken by the city and its wholesale water customers in order to reduce water diversions and their impacts on wildlife. The city and its wholesale customers should provide incentives to encourage implementation of "beyond code" water efficiency measures. A notable example of the kind of "outside-the-box" measures needed to safeguard water resources is the King Street Center building in downtown Seattle, which captures rooftop rainwater for toilet flushing, saving 1.4 million gallons of fresh water per year.

11 We also urge the city and its wholesale customers to step up public education encouraging residents to landscape with native plants that do well in local growing conditions, practice "grasscycling," and forego lawn watering during the summer.

12 Growth: We are concerned that the proposed increase in water diversions and the Additional Water Storage Project will have growth inducing impacts that will further encourage sprawl in south King County, which in turn will lead to additional proposals for water resource development that will cause harmful impacts on fish and wildlife. This issue requires additional analysis.

Thank you for your attention to our concerns.

Sincerely,

Jim DiPeso, Forests Chair
Rainier Audubon Society
PO Box 778
Auburn, WA 98071
http://rainier.wa.audubon.org

National Audubon Society

Washington

Washington State Chapters of National Audubon Society

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Pilchuck
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Whidbey
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March 28, 2000

Tim Romanski
U.S. Fish and Wildlife Service
Habitat Conservation Plan Program
510 Desmond Drive, S.E., Suite 102
Lacey, Washington 98503

RE: National Audubon Society Comments Regarding the Tacoma Water Habitat Conservation Plan

Dear Mr. Romanski:

1 The Washington State Office of the National Audubon Society has reviewed the Draft Environmental Impact Statement and the Habitat Conservation Plan (HCP) for Tacoma Water's (City of Tacoma Public Utilities Water Division) proposed Incidental Take Permit (ITP), for its forest and water management activities in the Green River Watershed in Southern King County, Washington. Based upon our analysis, we have concluded that the proposed HCP fails to meet some of the requirements of the Endangered Species Act (ESA), and its implementing regulations and policies. Consequently, we urge that the Services withhold issuance of an ITP until the provisions of the plan can be modified to bring it into compliance with the ESA.

Our comments primarily address take and the impacts of take in the terrestrial habitats of the upper watershed.

2 According to section 10(a)(2)(B) of the Endangered Species Act and associated Federal regulations, HCPs must meet six requirements before an incidental take permit can be issued. It is imperative that the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (the Services) rigorously apply these criteria in their evaluation of the proposed plan. These requirements are:

1. all takings must be incidental,
2. impacts must be minimized and mitigated "to the maximum extent practicable,"
3. there must be both adequate funding, and provisions to address "unforeseen circumstances,"

4. the taking must "not appreciably reduce the likelihood of the survival and recovery of the species in the wild;"
2 5. The applicant must ensure that additional measures required by federal regulators will be implemented, and
6. federal regulators must be certain that the HCP can and will be implemented.

3 Furthermore, the new "Five-Point Policy" for implementing the so-called "No Surprises" assurances requires that HCPs must state measurable biological goals and objectives, and
4 must have monitoring and adaptive management provisions relevant to the desired biological outcomes.

Based upon our analysis, it is our conclusion that the proposed HCP fails to meet several of these requirements. First, the plan fails to minimize and mitigate the impacts of take to the maximum extent practicable, as required by law. Second, the plan proposes biological goals and objectives that are not expressed in quantifiable terms, as required by the Secretary's Five Point Policy. Third, by implementing measures that will not achieve the stated goals, the plan fails to comply with the requirement that management actions must not appreciably reduce the likelihood of survival and recovery.

1. Failure to minimize and mitigate impacts to the maximum extent practicable:

The Tacoma Water HCP does not provide convincing evidence that Alternative B mitigates take to the maximum extent practicable, or that Alternative C—no commercial timber harvest—is not practicable. Unlike a timber company, whose sole source of revenue is the sale of forest products, Tacoma Water has alternate sources of revenue. The potential losses incurred by a cessation of commercial timber harvest could be compensated by an increase in the price of water. Because Tacoma Water is a publicly funded monopoly, and does not have to compete in a global market as do timber companies, it should be held to a higher mitigation standard.

The HCP and its supporting EIS fail to objectively and independently evaluate assertions by
5 the applicant that stronger mitigation measures are "impracticable" or "infeasible." Such assertions are not supported in the text by reliable and specific documentation of impracticability or lack of feasibility. Instead, the public is asked to accept at face value the contention that increased prices for water are not possible. In short, the public is asked to accept severe risks to the viability of permitted species, based upon the mere conjecture that consumers are unwilling to pay higher water rates.

Tacoma Water's assertion that prohibition of commercial timber harvest is impracticable is even less convincing in light of the recent Cedar River Watershed HCP developed by the city of Seattle. Experience in that case demonstrated that most water purchasers did not object to paying higher rates in exchange for enhanced security of fish and wildlife populations. Unless Tacoma Water can provide evidence that ratepayer resistance to increased prices leaves no alternative but to continue commercial timber harvest, Alternative B must not be considered the maximum amount of mitigation practicable.

2. Failure to state measurable biological objectives:

Throughout the HCP, wildlife and habitat objectives are stated in vague, subjective, qualitative terms that do not commit the applicant to any specific outcome. Objectives such as "appropriately manage lands," "protect habitat, " or "minimize the effects of timber harvest" do not provide the public with any assurances that the impacts of take will be adequately mitigated. Such terms invite future disputes over the exact meaning of "appropriate" or "minimize," and do not allow an adaptive management program to assess whether an objective has been achieved. Thus no certainty is provided for biological
6 resources. Because the HCP lacks measurable objectives regarding many fish or wildlife populations or habitat, the monitoring and adaptive management components can not contribute to the security of listed species.

Objectives must be expressed in terms of desired resource conditions, not merely in terms of management prescriptions. For example, the objective for snags, green recruitment trees and logs should state the desired number or volume of each of these components desired on the landscape. Management prescriptions should be applied to achieve these objectives. This allows management prescriptions to be assessed using monitoring, and adjusted if necessary using adaptive management.

3. Failure to "not appreciably reduce the likelihood of the survival and recovery of listed species in the wild" resulting from inadequate mitigation measures to achieve the stated goals:

A) Management of the "Natural Zone":

The HCP states that the long-term goal for the "Natural Zone" is to allow forest stands to develop into late seral condition through natural forest succession (p. 5-78). Yet the management prescriptions for the natural zones allows the removal of "danger trees" from the stands. The rationale section on page 5-78 contains additional qualifiers on the prohibition of logging, stating that timber harvest will be allowed if it is conducted "to improve habitat for one or more fish or wildlife species." The stated goal for the natural
7 zone will not likely be achieved if timber is removed from this zone.

It is unclear from the HCP how the natural zone will be managed. HCM 3-01B prescribes "removal" of danger trees. Elsewhere in the text, however, it is stated that if danger trees are felled, they *may* be left in place on the ground (p. 5-82, HCM 3-01F, first bullet point). The latter must be required if the HCP is to meet its stated goal of allowing Natural Zone stands develop into late-seral forest conditions.

There is ample evidence in the forestry and wildlife literature documenting that dead and down wood are essential components of late seral forest condition. "Natural forest succession" includes more than the mere growth of trees. It also includes the death and decomposition of trees, and the development of complex habitat structure on the forest floor composed of down logs in various states of decay, as well as standing snags. Any proposal to remove trees from the natural zone is incompatible with the goal of developing "late seral

forest condition through natural forest succession." To achieve this goal, dead or "danger" trees must be retained in the stand. If it is necessary to reduce hazards from "danger trees," these trees should be felled in a safe location and be retained on the forest floor. This should be explicitly prescribed in HCM 3-01B.

7

The conditions under which timber harvest in the Natural Zone may be conducted "to improve habitat for one or more fish or wildlife species" (p. 5-78, next-to-last sentence) are not clearly articulated in the HCP. This open-ended exemption from the prohibition on logging in the Natural Zone renders HCM 3-01B unenforceable. Consequently, the public receives no assurances that forests in the Natural Zone will achieve the desired condition. The HCP must be revised to disclose to the public the precise circumstances under which timber harvest "to improve habitat for one or more fish or wildlife species" will occur. Furthermore, such activities must not be allowed to occur without evaluation and written consent of the appropriate federal agencies.

8

B) Prescriptions for snags, green recruitment trees and logs:

9

While these prescriptions are an improvement over current forest practices, they are still insufficient to justify permit coverage for species which require large snags and/or high volumes of down wood.

The prescription to leave four logs 12" in diameter and 20 feet long per acre will not even come close to providing the volumes of down wood observed in studies of pileated woodpecker habitat. In one such recent study in the Blue Mountains, Torgerson and Bull (1995) observed average down wood volumes of about 110 cubic meters per hectare. The prescription in the Tacoma HCP will yield approximately 9.4 cubic meters per hectare, or about 8.5% of the levels suggested by the best available science. Managing down to this level places the pileated woodpecker at considerable risk. An incidental take permit should not be issued for pileated woodpecker unless down wood volumes can be maintained at levels more closely approximating those reported in the wildlife literature.

10

C) Pacific Fisher:

The HCP notes that one reason for chronically depressed populations of fishers is "a general loss of habitat to logging of old growth coniferous forest." Yet the HCP proposes to clearcut 3,858 acres of mature forest over the life of the plan. To mitigate this take of potential fisher foraging and denning habitat, the HCP merely proposes seasonal buffers around known denning sites. This mitigation is inadequate for three reasons. First, the fisher is so rare and secretive that it is unlikely that an active den site would ever be detected on Tacoma Water's lands before harvest operations commenced (there appears to be no provision to survey stands for fisher presence before logging). Second, the prescription proposes only *seasonal* protection of denning sites. After denning season the applicant would be free to destroy the denning habitat. Third, fisher populations are limited by more than merely the lack of denning sites. The loss of forests with high prey densities—i.e. forests with high canopy closure, abundant large woody debris, large cavity trees, and dense understory vegetation—is also a limiting factor (Lewis and Stinson 1998). The prescription

11

11 to mitigate impacts on fishers does nothing to address this factor. Consequently, the incidental take permit should not cover Pacific fisher unless steps are taken to limit harvest in the Commercial Zone to provide adequate foraging habitat for fishers.

D) Northern Goshawk:

12 The same principle described for Pacific fisher also applies to Northern goshawk. Too much emphasis is placed on merely providing seasonal protection for nests. Unless prescriptions are adjusted to protect the maximum amount of existing foraging habitat, permit coverage should not be extended to Northern Goshawk. We recommend that permit coverage be phases in as suitable habitat increases later in the permit period.

E) Pileated Woodpecker:

13 The prescription to merely "give preference to" leaving trees with signs of pileated woodpecker use is entirely inadequate. See the comments on observed down wood levels in pileated woodpecker habitat under 3. B) above.

F) Vaux's Swift:

14 The prescription to merely "give preference to" leaving trees with signs of Vaux's swift use is entirely inadequate. Vaux's swift roost and nest trees are extremely rare, and every effort should be made to preserve them. Because of their rarity, maintaining safety buffers around these trees is a practicable means of mitigation. Unless the prescription is changed to specify that all Vaux's swift nest and roost trees will be preserved, this species should not receive ITP coverage.

G) Marbled Murrelet:

15 The prescription to merely provide *seasonal* protection to occupied marbled murrelet habitat is entirely inadequate. ITP coverage should not be granted for this species unless all occupied habitat is protected year-round. Surveys to detect murrelet occupancy must be required for at least two consecutive nesting seasons before harvest. To claim that mere seasonal protection of occupied murrelet habitat is the maximum practicable strains the credibility of Tacoma Water. If Simpson Timber Company, a for-profit private enterprise, found it practicable to protect *all* occupied murrelet habitat (and some *un*occupied stands of suitable habitat as well), there is no reason that such protection should be deemed impracticable for Tacoma Water.

<u>Regarding Issuance of an Incidental Take Permit</u>

16 The purpose of the Endangered Species Act is to conserve threatened and endangered plants and animals and the ecosystems upon which they depend. This conservation objective must be the paramount test applied by the Services in evaluating the adequacy of the HCP. Our analysis concludes that the Tacoma Water HCP fails this test. The proposed excessive take of covered species habitat, the lack of quantifiable resource objectives, and the inadequate

mitigation combine to create an unacceptable level of uncertainty for wildlife resources. If implemented as currently proposed, the HCP will create an excessive level of risk to public
16 resources, and will not guarantee a reasonable probability of meeting the conservation objectives of the ESA.

Therefore, the National Audubon Society advises that the requested Incidental Take Permit be withheld on the grounds that: 1) the HCP does not guarantee that impacts of the permitted acts will be minimized and mitigated to the maximum extent practicable, 2)
17 that the HCP does not express measurable biological objectives, and 3) that the HCP fails to demonstrate that the permitted acts will not appreciably reduce the likelihood of the survival and recovery of listed species in the wild. The National Audubon Society urges the Services to withhold issuance of an ITP until the provisions of the Tacoma Water HCP is modified to bring it into compliance with the Endangered Species Act.

Respectfully submitted,

Timothy P. Cullinan
Director of Science and Bird Conservation

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Torgersen, T.R. and E.L. Bull. 1995. Down logs as habitat for forest dwelling ants: the primary prey of pileated woodpeckers in northeastern Oregon. Northwest Sci. 69:294-303.

Date: 03/31/2000 2:59 PM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:Tacoma Water proposed HCP

Author: Tim Romanski at TPO-OLES
Date: 03/31/2000 2:59:34 PM
Priority: Normal
To: Jon Hale
Subject: Fwd:Tacoma Water proposed HCP

Forwarded w/Changes

Author: David Adams <skookum@nwlink.com> at FWS 03/31/2000 12:54:04 PM
To: tim_romanski@fws.gov at FWS
Subject: Tacoma Water proposed HCP

Forward Header

Subject: Tacoma Water proposed HCP
Author: David Adams <skookum@nwlink.com>
Date: 03/31/2000 12:54 PM

March 31, 2000

Tim Romanski
U.S. Fish and Wildlife Service
Habitat Conservation Plan Program
510 Desmond Drive, S.E., Suite 102
Lacey, Washington 98503

RE: Tahoma Audubon Society response to Tacoma Water's proposed Habitat
Conservation Plan

Dear Mr. Romanski:

The Tahoma Chapter of the National Audubon Society has reviewed the Draft
Environmental Impact Statement and the Habitat Conservation Plan (HCP) for
Tacoma Water's (City of Tacoma Public Utilities Water Division) proposed
Incidental Take Permit (ITP), for its forest and water management activities
in the Green River Watershed in Southern King County,
1 Washington. Based
upon our analysis, we have concluded that the proposed HCP fails to meet
some of the requirements of the Endangered Species Act (ESA), and it's
implementing regulations and policies. Consequently, we urge that the
Services withhold issuance of an ITP until the provisions of the plan can be
modified to bring it into compliance with the ESA.

2 Our comments primarily address take and the impacts of take in the aquatic
habitats of the upper watershed.

According to section 10(a)(2)(B) of the Endangered Species Act and associated Federal regulations, HCPs must meet six requirements before an incidental take permit can be issued. It is imperative that the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (the Services) rigorously apply these criteria in their evaluation of the proposed plan. These requirements are:

1. all takings must be incidental,
2. impacts must be minimized and mitigated "to the maximum extent
2 practicable,"
3. there must be both adequate funding, and provisions to address "unforeseen circumstances,"
4. the taking must "not appreciably reduce the likelihood of the survival and recovery of the species in the wild,"
5. The applicant must ensure that additional measures required by federal regulators will be implemented, and
6. federal regulators must be certain that the HCP can and will be implemented.

The proposal to re-introduce an ESA listed species (Chinook Salmon, in this instance) to a critical life stage habitat that has been significantly impaired. Extensive logging in the upper Green River Watershed has altered original stock spawning gravels in both composition and availability. Tributary stream temperatures in some instances exceed Washington State water quality standards. As well as posing potential sub-
3 lethal effects on juveniles, higher stream temperatures induce earlier emergence timing and the subsequent problems of available forage and exposure to predation. Has the question of genetic alteration of this stock been fully addressed? Will possible changes in the existing run take place by removing the fish from current spawning areas and then introducing them into impaired or limited spawning and rearing habitat?

Tacoma Water's policy of cutting timber to improve water quality is unexceptable. The Services review of the proposed HCP in predicated upon the health of the species listed. Until such time as impaired conditions
4 are remedied either over time with no logging, or through active restoration efforts and no logging on contributing streams, no Incidental Take Permit should be issued.

Sincerely,

David Adams
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March 31, 2000

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Re: Comments on the Green River HCP, DEIS, and Implementation Agreement

To Whom It May Concern:

The Center for Environmental Law & Policy thanks both Tacoma Public Utilities (Tacoma or TPU) and the Services for the opportunity to comment on the draft HCP (HCP), draft EIS (DEIS), and Implementation Agreement relating to Tacoma's operations on the Green River.

CELP'S COMMENTS ON THE GREEN RIVER HCP AND DEIS

The Center for Environmental Law & Policy (CELP) is a nonprofit, membership organization dedicated to clean, flowing waters for Washington. CELP is integrally concerned with conserving and restoring the state's precious water resources, and protecting the unique marine and riverine life that depends upon these resources.

1 CELP is specifically concerned with protecting instream flows for the many rivers and streams in the state. Any attempt at modeling a flow regime for a river entails an incredible amount of uncertainty. Protecting the natural functions of a river to the greatest extent possible is the most important variable in any equation that attempts to balance river use with ecological health. The Proposed Second Supply Project actually increases artificial interference with the Green River, instead of minimizing and mitigating the level of current interference. The Second Supply Project includes further alterations to Tacoma's existing facilities, and places a weighty reliance on the Green River for regional water supply. While the project guarantees higher base flows in summer months, these higher flows will come from spring runoff stored and released to mask the effects of current withdrawals in the summer season. This creates an even more artificially altered flow regime, and presses the weight of regional water demand upon an already-troubled river system.

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The Green River should be managed to minimize the effects of current withdrawals, to avoid placing any more reliance on the Green for regional supply, and to more closely approximate a natural flow regime. The Services are contemplating providing Tacoma with a 50-plus year license to kill fish. Before gaining such a license, Tacoma should be required to minimize their
2 current burdens on the Green, rather than increase reliance on the river to fulfill indefinite regional demand in the future. Tacoma should also reduce its reliance on pulling more and more surface water out of the Green by better utilizing the water they currently do divert. By implementing aggressive conservation strategies, seeking water right transfers to meet future demand, and exploring reuse options, Tacoma can greatly reduce the burden placed upon the Green by municipal water demand, and keep more water instream for fish.

The following comments address CELP's specific concerns with Tacoma's management plans under this HCP, as well as with the Services' DEIS and Implementation Agreement.

FLOWS

Summary of Flow Regime in HCP

Under Tacoma's proposed plan, flows set by Ecology under the Instream Resource Protection Program (IRPP) will be followed from November to July, and are applicable to Tacoma's First and Second Diversion Water Rights. Under the Muckleshoot Agreement, Tacoma will maintain higher minimum flows for summer and early fall. This includes seasonal restrictions on the Second Diversion Water Right through the setting of seasonal minimum flows. These base flows focus on "promoting a healthy instream ecosystem". *See* HCP at pg. 5-19.

The HCP also states that "[m]aintenance of minimum flows will provide a level of resource protection but will not provide the full range of flow variability needed to satisfy ecosystem function. Flow variations, to the extent allowed within the operation of HHD, are provided by other habitat conservation measures." *See* HCP at pg. 5-17. With an accelerated refill rate for water stored behind Howard Hanson Dam (HHD), TPU will create a block of non-dedicated water that can be used for (1) augmenting HHD releases during short-term low flow periods in spring; (2) augmenting HHD releases during late May and June to protect steelhead incubation; (3) suspending HHD storage during storms to allow freshets to pass; or (4) providing short-term freshets to aid downstream migrating salmon. *See* HCP at pg. 5-39.

Uncertainties in Modeling and Inadequacy of Base Flows

These seasonal increases in base flows and additional storage to provide for artificial freshets may offer some improvement for Green River habitat. Yet even these management goals are not based on a solid understanding of what management regime will best benefit the Green
3 River system and salmon. Many uncertainties and assumptions exist in Tacoma's overall plan for implementing this HCP, and many of the measures in the HCP will need to rely on further studies and analysis to be complete and/or effective. For example, Tacoma states that "further studies are needed to more fully determine the overall effects of different refill rates" at HHD. *See* HCP at pg. 5-40. Also, many assumptions are drawn about habitat needs -

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"[m]aintaining higher base flows is assumed to benefit outmigrant survival by increasing their rate of migration through the HHD reservoir and lower mainstem river." *See* HCP at pg. 5-41.

While the river system may be too altered to perfectly approximate the natural flow and variation that existed prior to diversion alterations, the HCP should more fully recognize the potential problems associated with relying on current models and understanding of fish needs. Both the IRPP flows as well as the concept of setting "base flows" in general have been highly criticized as inadequate to protect the full range of needs of any river system. *See* D.T. Castleberry et al., *Uncertainty and Instream Flow Standards*, 21 Fisheries 20 (1996); Dilup Mather et al., *A Critique of Instream Flow Incremental Methodology*, 42 Can. J. Fish. Aquat. Sci. 825 (1985); Holly A. Coccoli, *Effects of Springtime Flow Alteration on Side Channel Habitat in the Green River*, University of Washington Master of Science Thesis (1996). By setting minimum flows, Tacoma and other water managers are only concentrating on the instream needs of the fish - the "critical fish requirements". They do not take into account the effect stream flows have on the river ecosystem as a whole. An ecosystem approach includes consideration of lateral and vertical habitat as well as instream habitat - lateral being the riparian areas and floodplain extending away from the river, vertical including the water flow and habitat below the river's surface. According to Holly Coccoli, "... the minimum flow requirements established under the I.R.P.P. and the Muckleshoot-Tacoma settlement agreement... fail to meet standards suggested in the recent literature for multiple flows to protect aquatic resources." *See* Coccoli, at 10. "A more ecosystem-based streamflow management framework requires integration of flow regimes to maintain four groups of biotic and abiotic resources:

3

1) Overbank flows that inundate riparian and floodplain areas;
2) Floodflows that form floodplain and valley features;
3) In-channel flows that sustain the function of the instream system; and
4) In-channel flows that meet critical fish requirements." *Id.* at 24.

Minimum flows provide a worse case protective mechanism, and should not be used as a stop gauge against which water diversion and withdrawal effects are forcefully pushed. While base flows assume that fish are protected at a set level, most side channels will not necessarily be protected even at Tacoma's target flows.

Adaptive Management and Flows

Tacoma does address the pitfalls of relying on base flows by committing to a series of flow management research measures to better understand the complex relationships of the Green River system, including the relationships between lateral and side-channel habitats. *See* HCP at pg. 6-7. These management measures are intended to "provide NMFS and USFWS and other members of the Green River Flow Management Committee with the knowledge and opportunity to better manage flows and fisheries in the Green River", and are intended to aid in Tacoma's adaptive management. *Id.*

4

While we commend Tacoma for recognizing the inadequacy of the flows set in the HCP, this research commitment lacks any real teeth. Tacoma will never be required to change any habitat conservation measures to implement the lessons learned from this research. The HCP

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clearly states that Tacoma *may* modify implementation of the HCP based on the results of this research, but *if and only if* Tacoma consents first: "any modifications to the conservation measures identified in the HCP shall not represent additional commitments of money, water, or other resources without the consent of Tacoma." *See* HCP at pg. 6-4.

4

The HCP further states that, "[a]s information and understanding of the relationships between the managed flow regime and the biotic resources of the Green River increases, the operation of HHD can be refined within the range of legal and institutional requirements to balance needs of various fish species, life stages, and water supply." *See* HCP at pg. 5-30. The HCP needs to identify these institutional and legal requirements. Under "No Surprises" guarantees, Tacoma will not be liable for changing or altering habitat measures, and will not have to alter agreed-upon flows for the next 50 years. Also, Tacoma is contracting to provide a set amount of water for regional supply - a set amount that does not provide for future variation and reallocation to fish needs so long as base flows are met. Due to these project constraints and conditions, the HCP needs to clarify just how adaptive management will allow for any really effective change in the flow regime when research and analysis reveal the need for such change.

5

Conclusion re: Flows

We commend Tacoma's efforts in conjunction with the Muckleshoot Tribe to increase flows to benefit fish, and to fund research efforts to better understand the needs of the Green River system. We do not agree, however, with nailing this flow regime down in a 50-year plan. Where monitoring and analysis reveal the flows to be inadequate to protect the health of the Green River system, adaptive management within the confines of this HCP will not allow for needed change.

6

PROBLEMS WITH ADAPTIVE MANAGEMENT

Adaptive Management Goals are at Odds with "No Surprises" Guarantees

Tacoma has signed an implementation agreement with the Services that states nothing in the HCP or EIS can cause a reduction in its water supply. The Services and Tacoma have chosen adaptive management as a way to respond to uncertainty – yet this is not sufficient when it conflicts with "No Surprises" guarantees. The Services cannot allow so much certainty to Tacoma's operations when so much uncertainty exists in how to adequately protect the Green River, and balance water use with maintaining properly functioning river habitat.

7

While we realize these guarantees represent the crux of the Services' "No Surprises" policy and that such guarantees will be a part of the HCP under the Services' scrutiny regardless of our comments, the Services should provide more assurances that adaptive management will be taken seriously. We respectfully request that the HCP better explore and explain the interplay between adaptive management and "No Surprises" guarantees, and Tacoma's responsibility to change its operations when analysis reveals the need to do so for habitat protection. Furthermore, the Services should ensure that Tacoma's plan mandates enough management

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flexibility so that, when the needs of fish are not being adequately met, adaptive management changes will actually make a difference. One suggestion for achieving greater management flexibility is explored below.

Greater Flexibility in Municipal Storage Amount

Adaptive management within the confines of "No Surprises" guarantees allows for minor management changes within well-defined project constraints. A fixed amount of water dedicated to municipal storage provides an example of one such project constraint. While storage of water behind HHD is being touted as a source of extra water for flow enhancement purposes as well as municipal supply, this stored water comes with certain costs. Such storage only serves to shift water around in time by using spring runoff to mask the effects of increased withdrawals on low summer flows.

A great amount of uncertainty exists with the various modeling and assumptions relied upon in this HCP, yet nothing in it provides for meeting the needs of fish should the planned measures prove ineffective. What if the flows are found to be inadequate? What if it is
8 determined that fish need more side channel connectivity in certain years to allow for successful migration? We'd like to suggest that Tacoma expand project constraints to more fully address these concerns. One suggestion involves making the block of storage dedicated to municipal use a flexible rather than fixed amount. This would allow greater flexibility in meeting the needs of fish, and ensure that fish will still be taken care of even if some of the variables relied upon in this HCP turn out to be miscalculated. The purpose of this HCP is to ensure that Tacoma's actions do not hinder successful recovery of listed species – this necessarily entails a certain amount of flexibility on the part of Tacoma's management practices. Adaptive management cannot work if management does not have room to change enough to make a difference when the situation demands.

Adaptive Management and the Second Supply Project Agreement

A draft Second Supply Project Agreement, dated January 2000, has been negotiated between the cities of Tacoma, Seattle, Lakehaven, Covington and Kent. *See* Second Supply Project Agreement (Jan. 2000). Seattle recently released a DEIS proposing that the Seattle City Council authorize Seattle's signature on this Agreement. *See* Proposed Second Supply Project Agreement Draft Environmental Impact Statement, Seattle Public Utilities (Jan. 2000). The Agreement covers the use of Tacoma's Second Diversion water between the five cities, and creates a Project Committee composed of one representative from each city (with Tacoma
9 and Seattle having more voting shares than the other three cities). *Id.* at 14, 15. The Project Committee must approve any and all amendments and modifications to the "Project Specifications". *Id.* at 15. The "Project Specifications" include the water from the Second Diversion Water Right, the Second Supply Pipeline, improvements at Tacoma's Headworks dam, etc. *Id.* at 11. The "Project Specifications" also include all the fisheries and environmental enhancements committed to by Tacoma under this HCP. *Id.*

Under this Agreement, Tacoma will not have sole operating control over its operations on the Green River. Tacoma will have control over "day-to-day operations" only. *Id.* at 12. Tacoma will have only 3 of 9 votes when any change or modification to the project is proposed. *Id.* at

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9 15. Signing this draft Agreement is part of Tacoma's proposed plans under this HCP. The fact that Tacoma will eventually be only one of five partners, and must obtain approval from its other partners as specified in a separate Agreement, must be addressed. Specifically, how can Tacoma guarantee it will be able to meet the adaptive management goals in the HCP, when any change or modification to habitat measures requires approval from its other partners? The HCP should include a thorough discussion of this.

Changed Circumstances

10 Specific concern over the incompatibility between "No Surprises" and adaptive management arises with the handling of "changed circumstances" under the HCP. For "changed circumstances" (including fires, floods, and landslides), Tacoma has agreed to certain management actions and in every case considers "no additional measures" to be necessary. *See* HCP section 3.2. However, as part of Tacoma's agreed-upon management listed under the HCP section devoted to landslides, Tacoma will conduct timber harvesting in an area designated as the "Conservation Zone" as well as in the "Commercial Zone". *See* HCP at pg. 3-5. While any timber harvest is likely to increase the natural occurrence of landslides, this zoned timber harvest is listed as a measure which will "minimize the occurrence and impact of landslides". *Id.* Even where adaptive management analysis proves this harvest to be detrimental and necessarily in need of change, Tacoma will never be required to change this under the "No Surprises" guarantee.

11 As a related issue, a disconnect exists between the Implementation Agreement and HCP, which are at odds with regard to Tacoma's responsibilities to manage for "changed circumstances". The Implementation Agreement seems to state in Section 9.1 and 9.2 that, in the event of changed circumstances, Tacoma would be *required* to change its operations to further mitigate harm to listed species. Yet the HCP states in Section 3.2.3 that Tacoma is *not required* to do additional mitigation or incur response costs in the event of changed circumstances *unless Tacoma specifically consents*. The Implementation Agreement, under Section 5.0, prevails when a direct conflict between the Agreement and the HCP occurs. Yet the section in the Agreement dealing with changed circumstances incorporates the HCP specifically, and makes unclear which controls. We request that the HCP be rewritten to provide the Services with enforcement authority in the event of changed circumstances. Change is an integral part of any ecosystem. In the event that Tacoma's activities such as timber harvesting are found through adaptive management analysis to be inadequate protection for the river environment, Tacoma should be required to alter its operations.

STATE WATER LAW REQUIREMENTS

The Implementation Agreement states that the Services will issue Tacoma an Incidental Take Permit (ITP) upon "satisfaction of all other applicable legal requirements". *See* Implementation Agreement at pg. 6. CELP respectfully requests the following state water law requirements be sufficiently addressed before the Services consider issuing Tacoma an ITP.

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Connection with Seattle Does Not Qualify as an Intertie

The DEIS states that Tacoma is "expected to participate in a regional intertie with suppliers in King and Snohomish Counties to make efficient use of regional water supplies..." *See* DEIS at pg. 2-5. The DEIS defines an intertie as "a water conduit system that allows an exchange of water between adjacent suppliers and service areas." *Id.*

12 The proposed connection between Seattle and Tacoma under the Second Supply Project does not qualify as an "intertie" under state law. An intertie cannot include development of new sources of supply to meet future demand, nor can it be for emergency supply purposes. *See* RCW 90.03.383. The connection between Tacoma and Seattle's systems will require development of new sources of supply to meet future demand, and states emergency supply as one purpose. Where the DEIS addresses this connection as an intertie, an overview and analysis of state law requirements for interties should be included to clarify this issue.

Tacoma's Water Right Does Not Allow for Delivery of Water to Seattle

Seattle has recently put a draft EIS out for public review, concerning its role in the Second Supply Project. Seattle changed the designation of "intertie", however, stating instead that Tacoma's Second Diversion Water Right permits delivery of water to Seattle. This argument
13 centers on language in the permit stating that the "place of use" for Second Diversion water includes the area served by Tacoma, "by direct service or interlocal agreement". *See* Second Diversion Water Right Permit, Department of Ecology Permit No. S1-00726P. However, no interlocal agreement existed between Seattle and Tacoma at the time of permit application or issuance. Consequently, Tacoma's Second Diversion Water Right does not cover delivery of water to Seattle, and Tacoma would at the very least need to apply to Ecology to change the place of use.

Third Alternative Requires Change

14 Construction and operation of a new diversion on the Green River would require that Tacoma apply to Ecology for a change in the point of diversion.

Permit Needed for Municipal Storage Behind Howard Hanson

Under state water law, Tacoma must obtain a permit for putting water stored behind HHD to beneficial use for municipal supply purposes. *See* RCW 90.03.370. This permit must comply
15 with other applicable sections of Washington's Water Code, requiring that Ecology find water to be available, the use to be beneficial, no impairment to existing rights, and no detriment to the public interest. *Id.* The beneficial use and public interest inquiry require that Tacoma show a need exists for this project. Specifically, Tacoma should discuss whether regional demand for this water really validates the supply alternative chosen.

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PLANNED GROUNDWATER DEVELOPMENT MUST BE INCLUDED IN THE PROPOSED ACTION

The DEIS considers development of the South Tacoma Aquifer as one potential independent source of water, then discounts this option and does not include groundwater development in the Proposed Action or the other two alternatives. *See* DEIS at 2-27 and 2-28. Yet a bilateral Storage Agreement between Seattle and Tacoma calls for the development of 4-5 new wells in the South Tacoma aquifer, providing an additional 3300 acre feet of water per year. *See* Seattle/Tacoma Storage Agreement, attached as Exhibit U to the Second Supply Project Agreement (Jan. 2000). Seattle's Proposed Second Supply Project Agreement DEIS, recently out for public review, also reinforces the fact that groundwater development is part of the overall Second Supply Project. *See* Proposed Second Supply Project Agreement Draft Environmental Impact Statement at S-4, Seattle Public Utilities (Jan. 2000).

16 Since the Second Supply Project includes development of additional groundwater supplies by Tacoma, the DEIS and HCP must fully analyze this development as part of the Proposed Action. Specifically, the DEIS and HCP must analyze impacts to groundwater and surface water, as well as discuss compliance with state water permitting requirements. As Tacoma's current water rights do not cover development of an additional 3300 acre feet, Tacoma would need to apply for a permit to withdraw more groundwater. Increased withdrawals from the South Tacoma Aquifer could affect flows in connected surface water bodies, impair senior water rights, and deplete the aquifer where withdrawals exceed recharge. These impacts must be fully analyzed and included under the Proposed Action Alternative in the DEIS, and under Tacoma's operational plans in the HCP.

ALTERNATIVES CHOSEN ARE INADEQUATE

The only alternative to the Proposed Action besides the No Action Alternative involves construction and operation of a new diversion on the Green. The main benefit of this diversion is that it would be farther downstream than the current diversion, and would thereby displace the effects of water withdrawal.

This "alternate diversion" alternative still includes the Second Supply Project and Tacoma's plans to be a regional water supplier. Consequently, the only three alternatives considered by
17 the Services are: (1) not granting an ITP, resulting in Tacoma continuing its Second Supply Project plans since, according to the Services, Tacoma's activities have not yet been linked with quantifiable levels of take; (2) granting an ITP, and allowing Tacoma to continue with its Second Supply Project plans under the Proposed Action; and (3) granting an ITP, and allowing Tacoma to continue with its Second Supply Project, essentially only changing the point of withdrawal on the Green to displace flow effects for one portion of the river. These options can be summed up as follows: Tacoma becomes a regional water supplier, Tacoma becomes a regional water supplier, or Tacoma becomes a regional water supplier.

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Tacoma's plans to become a regional water supplier, however, will place a weighty regional reliance on the Green River now and in the indefinite future. Beyond this, the Second Supply Project Agreement, while intently negotiated between the five cities, is not yet a "done deal". Considering that 32 species will be affected by this HCP, 7 of which are listed, and that the
18 Second Supply Project currently relies on a number of variables, the Services should provide another alternative. This alternative should include development of an HCP for the Green River, and an assessment as to whether Tacoma's activities will hinder salmon recovery. As Tacoma is potentially liable for ESA "take" regardless of the other four cities' involvement in their operations, this added alternative should not involve Tacoma becoming a regional water supplier.

DEDICATED vs. NON-DEDICATED STORAGE BLOCK CONCEPT IS CONFUSING

According to Habitat Conservation Measure 2-02, fish needs during refill can be met with the use of a non-dedicated block of stored water. *See* HCP at pg. 5-31. The explanation of this is
19 incredibly confusing. Specifically unclear is what portion of water will be used, and how an accelerated refill rate can create a portion of "non-dedicated" water. Also, a discussion should be included about the counterintuitive strategy of using stored water to compensate for the water storage effects.

MITIGATION FUNDING

Tacoma plans to fund mitigation measures outlined in the HCP in part from timber sales. According to the DEIS, Tacoma has informed the Services that requiring any reduction in these timber sales will create a disincentive for them to continue their water quality and habitat management efforts. This certainly seems like a veiled threat.

20

Tying restoration efforts designed to repair and mitigate for impacts from activities such as timber harvesting, to the very revenues derived from this same activity is a counterintuitive, backwards attempt at conservation. The Services should require much more responsible and reliable methods of mitigation funding before granting Tacoma the right to kill more fish.

WATERSHED OWNERSHIP

Tacoma owns approximately 10% of Green River watershed lands, and CELP commends Tacoma for its past efforts to acquire these lands. However, activities conducted on the other
21 90%, including logging, greatly impact the Green. We suggest that Tacoma follow Seattle's Cedar River example, by acquiring more of the watershed and instituting a no harvest commitment on all acquired lands.

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CONSERVATION SHOULD BE TACOMA'S MAIN FOCUS

22 Tacoma expects to take more water out of the Green to meet future water demands. Tacoma needs to realize, however, that it cannot just continually seek new water rights to meet growing water needs – conservation is not a secondary or alternative option to gaining new water. While showing some initial savings since 1991, Tacoma has still failed to set specific savings goals, and has relied on largely voluntary water use reductions. The HCP does not provide for a more aggressive conservation strategy, and Tacoma officials stated at a public
23 meeting that, while conservation will be included in their 50-year operating plan, no definite plans exist to institute specific savings goals. Beyond this, a 50-year ITP deal will not require Tacoma to implement any additional conservation initiatives even when new technology becomes available to allow for greater savings.

The water that Tacoma pulls out of the Green severely affects flows and fish habitat. The cost of this down the road will far outweigh the cost of conservation efforts that can put flows back in the Green. Tacoma could satisfy much of its service area's future demand for water by implementing an aggressive conservation strategy and exploring options such as water
24 transfers and reuse. We commend Tacoma for the conservation savings already realized within its service area. Yet we strongly suggest Tacoma realign its water supply strategy to make conservation and reuse its primary focus, as opposed to a focus on pulling more and more water out of the Green to fulfill not only its own, but regional growth as well, in the indefinite future. Tacoma should be required to do more to conserve water before they are allowed to kill fish by taking more of it.

CONCLUSION

The Services possess great latitude in requiring an ITP applicant to minimize and mitigate the effects of their actions to the maximum extent practicable. The Services' first priority rests with ensuring recovery of listed species, and they have a duty to ensure Tacoma's actions will
25 not appreciably reduce the likelihood of survival of listed species.

With the standard set at recovery, the Services need to do more to ensure that Tacoma's actions will not hinder the successful recovery of listed species. They should not assume the only options available involve Tacoma becoming a regional water supplier, placing regional water reliance on this one river system. Instead the Services need to include an alternative that involves an HCP, but does not involve Tacoma becoming a regional water supplier. They should also require Tacoma to minimize and mitigate its actions to the maximum extent practicable. Tacoma should: (1) be more responsible with the water it diverts by committing
26 to aggressive conservation strategies, with the goal of keeping more water instream; (2) not harvest timber on any of its watershed lands; (3) commit to better adaptive management implementation by expanding project constraints to mandate a more flexible response to unmet needs of fish, or by scaling back "No Surprises" guarantees; and (4) recognize the inherent uncertainty in locking down a flow regime for the next 50 years, and allow enough room to change this regime as necessity demands.

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Considering how recently people have started to realize the true extent of the salmon crisis, and how recently people have started studying what to do about it, one incontrovertible fact emerges: science is changing all the time, and we are constantly proving ourselves wrong. The methods used to set base flows, for example, are already being criticized by scientists as unreliable for protecting fish and fish habitat. 27

An ITP is something akin to an insurance policy – with Tacoma paying a small fee and passing liability for the unforeseen consequences of its actions to the federal government. Considering the incredible uncertainty surrounding river management and the needs of fish, coupled with the crisis point at which this state finds itself in trying to recover salmon, the premium on this policy should be much, much higher.

Again, thank you for the opportunity to comment.

Sincerely,

Kristie E. Carevich

Kristie E. Carevich
Associate Attorney

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U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE

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Tim Romanski
U.S. Fish and Wildlife Service
510 Desmond Drive, S.E., Suite 102
Lacey, Washington 98503-1263

March 31, 2000

RE: Tacoma Water Habitat Conservation Plan and draft Environmental Impact Statement for the Incidental Take Permit.

Dear Mr. Romanski,

I'm writing on behalf of the Pacific Crest Biodiversity Project and the Northwest Ecosystem Alliance to provide comments on Tacoma Water Habitat Conservation Plan (HCP) and draft Environmental Impact Statement (DEIS) for the Incidental Take Permit (ITP).

1 The proposed HCP Tacoma Water Department's Green River Habitat Conservation Plan provides a prime opportunity for the City to provide the best possible long-term protection of its lands, the water and the fish and wildlife dependent upon these resources. This opportunity will be missed if the City continues to rely on commercial logging of its forestlands in the upper Green River watershed. Ending logging and other improvements to the forest plan must accompany, not substitute for improved fish and flow provisions of the HCP, as addressed in other parts of these comments.

We object to a commercial logging program and the subsequent issuance of an incidental take permit by the US Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) for the six federally listed threatened and endangered species, one species proposed for listing, and 14 other unlisted species. The HCP fails to meet the requirements of the Endangered Species Act (ESA), 16 USC §§ 1531-1534, and for this reason alone, the permit request must be denied unless significant modifications occur.

2 The DEIS does not meet the requirements of the National Environmental Policy Act and its implementing regulations, 42 U.S.C. § 4331 et seq., 40 C.F.R. § 1500 et seq. The DEIS fails to adequately consider, evaluate, or document the direct, indirect, and cumulative effects of the destruction of terrestrial lands and evaluate or document how the considerable loss of habitat and lack of any mitigation measures will permit attainment of the objectives of the Endangered Species Act and other federal statutes and regulations.

3 The DEIS entirely fails to consider, evaluate, or document the environmental effects of fragmenting mature forests, isolating forest parcels, and eliminating critical wildlife habitat in the watershed. Impacts to species dependent on terrestrial environments are wholly impossible to determine as survey-information is lacking or insufficient. The amount of "take" and effectiveness of measures to minimize and mitigate "take" are equally impossible to determine.

4 Our analysis indicates that the HCP fails to meet the requirements of the Endangered Species Act (ESA) and associated regulations. Consequently, we recommend the incidental take permit for City of Tacoma lands be denied unless the HCP and EIS are significantly modified or the no-commercial logging alternative is deemed the preferred alternative. Furthermore, as the HCP process relies heavily on the accurate application of scientific information, we recommend that future iterations of the HCP be

4 reviewed and evaluated by an independent panel of academic and agency scientists, and by a citizen review board.

In summary, the following issues must be resolved:

Process and Documents

1) Quantifiable data and resource objectives lacking

According to ESA regulations and rules, the HCP must "include specific biological goals and objectives...." for measuring the effectiveness of conservation planning. In addition, biological objectives represent "...specific measurable targets for achieving the goals of the operating conservation
5 program." (Draft Addendum to the Final Handbook for Habitat Conservation Planning and Incidental Take Permitting Process." Federal Register, 64;45, March 9, 1999. Biological goals must correspond to full mitigation of impacts to the species, minimization and mitigation of impacts to the maximum extent practicable, and species' recovery needs, and other basic impact minimization and mitigation standards.

The Tacoma Water HCP fails to establish measurable biological goals for recovery, and for measuring "take" minimization and mitigation. Generally, the HCP's resource goals are extremely vague,
6 unverifiable, and unenforceable. The HCP fails to consistently discuss how the HCP and ITP and their resulting habitat conditions, population levels, and other outcomes will relate to the biological goals and standards proposed in available scientific literature. The HCP also fails to provide adequate quantitative analyses or other analyses of how impacts to most of the covered species will affect survival and recovery.

Sierra Club et al v. Bruce Babbitt et al found that current data on species' conditions and recovery needs must be used; goals included in recovery plans are not sufficient if conditions have changed since those
7 plans were written. Civil Action No. 97-0691-CB-C, Order August 4, 1998, S. Dist., AL, S. Div. The HCP and DEIS fail to meet these requirements. The HCP generally fails to identify species population levels and habitat conditions that would correspond to genuine recovery across the species' ranges, and fails provide concrete quantitative assessments of how the populations and habitat conditions stemming from the ITP and HCP will compare to these recovery standards.

Without quantifiable objectives, there are no substantive provisions that allow for monitoring effectiveness of prescriptions, and adjustments through adaptive management.

2) Proposed baseline is inappropriate

Tacoma Water proposes using current conditions as a baseline, yet much of the terrestrial wildlife habitat
8 necessary for supporting listed and unlisted species is highly degraded from poor land use practices. Consequently, the HCP will not reduce the risk of extinction to many species, including those requiring snag habitat, small streams, intermittent streams, and other habitat for survival and recovery unless considerable restoration of wildlife habitat is conducted.

9 3) Best available scientific information not employed

NEPA and ESA section 7(a)(2) and the Act's administrative rules require agencies to use the best available science. The HCP does not apply or consider the best available scientific information.

10 The HCP employs arbitrary rationales for thinning as a method for "accelerating" old growth conditions, completely unsupported by any scientific evidence. Throughout the draft EIS/HCP, there is discussion of the benefits of specially designed treatments to accelerate the development of old-growth conditions. However, no context is provided along with these statements. For example, what are the specific criteria which will be used to determine whether a stand needs to be "ecologically thinned"? What evidence are these criteria based on?

11 Creating old-growth through thinning has yet to be done. Studies show that there is no evidence that the thinning of stands 30 years or older results in any net ecological benefits[1]. The concept that one can "accelerate" old-growth conditions by thinning remains largely an untested assumption. Therefore, it should not be the primary basis of an old-growth restoration strategy. Furthermore, for an activity whose long-term benefits are unclear, thinning is an expensive experiment.

4) Adaptive management provisions will not allow for needed changes in management

12 The Tacoma Water HCP fails to provide an adequate effectiveness monitoring program to provide for adaptive management changes. Given that the HCP is for 50 years, adaptive management provisions must be substantive and effective.

13 Sufficient vegetation and wildlife sampling must be conducted to establish monitoring trends and the presence and distribution of species across the landscape. As proposed, the HCP will only train Tacoma employees in the identification of covered species, in the event that a species is sighted, leaving the discovery of a covered species completely to chance. This method will provide no accurate data as to the presence or absence of a covered species over the life of the HCP, and render any meaningful adaptive management provisions useless.

14 The HCP's compliance and effectiveness monitoring must occur frequently over time, including monitoring of species' populations and reproduction, habitat quantity, habitat and specific habitat components, habitat trends, and other goals and indicators. The Tacoma Water HCP has failed to do this.

5) High Standard for ITP

15 ITPs and HCPs should only be used in limited circumstances. The ITP and HCP should not be used to eliminate or degrade habitats across significant portions of the landscapes, ecosystems, or species' remaining ranges. Likewise, ITPs and HCPs should not be used where more effective alternatives exist. The no-commercial logging alternative is clearly a more effective alternative to the proposed action.

16 The Services must consider this alternative seriously, especially in light of the fact that City of Tacoma has provided no justification for commercial logging in their statement of purpose and need. Furthermore, the City has evaluated no alternatives to revenue generation. The ESA standard of minimizing impacts and providing mitigation to the maximum extent practicable has not been met.

17 It is essential to maintain late-successional forest habitat needed by several listed terrestrial species and to protect the upper Green River and its tributaries for fish habitat. The standard for an incidental take permit is far higher than for the state Forest Practices Act or Tacoma's current Forest Land Management Plan. Pursuing the goals of the Endangered Species Act, especially recovery, must be the driver in this HCP, not commercial logging.

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[1] Carey, A.B. (1998, November) Biodiversity and Intentional Management: A Renaissance Pathway. Science Findings, PNW Research Station, issue 9, p. 3

6) No Surprises still a problem

A 50-year incidental take permit is too long given the no surprises policy. Either a shorter permit period
18 or greater ability to modify the HCP to improve habitat conditions should be established. The current permit provides great amount of certainty to Tacoma, but great uncertainty to the public's fish and wildlife. This is not an equitable agreement, and must be changed.

Forest Management

1. Management Zones

Tacoma Water owns 10.1% of the land in the Upper Green River Watershed (14,888 acres), primarily along the banks of the Green River. Under the proposed HCP the existing Management Plan will be retained with few changes. The current forest management plan appropriately eliminated "maximizing" timber volume in the commercial zone. This HCP should eliminate the commercial logging altogether.

Thirty-nine percent of the area (the Natural Zone) will have the highest level of protection and no logging. Another 35% (the Conservation Zone) will sustain some amount of thinning of forests. The conservation zone is designed to develop into late-successional stage habitats. When this occurs the plan indicates logging will cease. While we certainly support the objective of ending the logging, again, we urge caution in manipulation of the vegetation to achieve the desired result. Only in areas recovering
19 from recent clearcutting should be considered for thinning operations.

Twenty-six percent of the land (the Commercial Zone) will be used for "producing merchantable timber". The revenues created from these practices will be used in watershed land acquisition, forest management, fish and wildlife habitat and water quality enhancement projects. Such logging activities place a priority of commercial interests over water quality and habitat protection no matter how many environmental precautions are taken.

Any management activities in the protected zones should receive careful scrutiny plus public involvement for significant actions. Salvage logging is of particular concern.

2. Ecological Risks

While some public officials assert that commercial logging will not harm water quality or wildlife habitat, there is much evidence to the contrary. Forests act as giant air and water filters, and also act as reservoirs by increasing water yields in the crucial dry months and reducing flooding in wet months. Preserving those forests diminishes the need for Tacoma's turbidity pool and flood control storage
20 volumes as well as the AWS (Additional Water Storage) project.

Logging can produce massive imbalances in the natural soil-forming and erosion cycles, increasing levels of sediment in our drinking water. Tacoma's lands, bordering the Green River, are some of the most vital for water and habitat protection, thereby increasing the need for preserving those forests.

3. Illogical Economics

Funding land acquisition and restoration efforts through commercial logging may establish an illogical economic model. Causing damage to repair damage does not make sense. The long-term costs of repairing ecological damage associated with logging far outweigh the short-term financial benefits (e.g.,
21 water filtration costs, landslides, road repair, etc.). Alternatives other than logging revenues, to fund the acquisition of lands in the watershed need to be explored. Timber markets are unpredictable, making logging revenues as a funding source a risky practice. We believe that when all of the above factors are considered (and they must be considered) it will be apparent that commercial logging doesn't economically benefit the community.

4. Forests & Wildlife

22 The Green River watershed has been heavily roaded and logged, with resulting impacts to the native forest ecosystem. Tacoma now manages important wildlife and fish habitat which includes significant late-successional forests. Full protection of these forests is the best assurance of maintaining high water quality and sustaining fish and wildlife populations. The Forest Service has stressed the importance of connectivity in late-successional forests through the checkerboard lands that include the Green River. While the current plan objectives attach greater importance to wildlife and fish habitat than earlier versions, it still fail short of that needed for the conservation and recovery of endangered species.

5. Wildlife Species

23 Many species will be adversely impacted by the proposed action. Those dependent on late-successional forests, including salamanders and other amphibians will be impacted the most. Acquisition and preservation of forests adjacent to the City's ownership could offset the impacts of the reservoir, logging, roadbuilding and other impacts of Tacoma's operations. Rock Creek, Sawmill Creek and Eagle lake would be good choices. A few examples illustrate the flaws of the draft HCP.

Marbled Murrelets

24 Tacoma owns lands in Rock Creek near where marbled murrelet nesting was found last summer. However, Tacoma proposes to continue logging in that area (Commercial zone). The HCP must reverse the trend of loss of habitat, and require restoration of murrelet nesting habitat in this area. Merely promising not to destroy murrelet nesting habitat is not sufficient for a 50 year ITP. Further monitoring for murrelets in the old-growth grove in Sawmill Creek should also be done.

Spotted owls

25 The Services cannot become complacent about this species whose population continues to dwindle. Spotted owl critical habitat units and state SOSEAs have been established in the Green River Watershed, underscoring its significant role as nesting habitat and dispersal habitat for the Cascades population. It is acknowledged as a critical connectivity corridor between the north and south cascades for many species, including the spotted owl. Given the degraded state of the forests in this area, USFWS cannot grant ITPs to destroy additional habitat here.

Northern Goshawk

26 In reviewing the conservation strategies developed for listed species, we would like to raise concerns regarding the lack of information and studies on the northern goshawk. Northern goshawks are highly sensitive to human disturbance. Unbroken canopy of second-growth forests in the lower watershed provide important habitat for goshawks.

Given the lack of information, the goshawk's sensitivity to disturbance, and the importance of second-growth lowland habitat, we question whether the potential impacts of the proposed action to the goshawk have been understated. The main basis for the net improvement to goshawk habitat as stated in the draft HCP is the ecological and restoration thinning of second-growth forests and long-term regeneration of forest habitat. We again question the actual long-term benefits of thinning, given that the practice is still considered experimental. Thinning is not adequate enough to use as a primary conservation measure for goshawks. We also question the baseline used in making this assumption (see: Proposed baseline is inappropriate).

We encourage the Services to deem the no commercial logging alternative as the preferred alternative to reduce disturbance in the form of timber harvest and road usage. The no commercial logging alternative would have the greatest positive effect for the northern goshawk, however, nowhere in the EIS is this stated. The EIS must be thorough and accurate in representing the benefits of each alternative.

Pacific Fisher

According to the Washington Department of Fish and Wildlife Status Report on Fisher (September 1998), fishers use forests with a high percentage of canopy closure, abundant large woody debris, large snags and cavity trees, and understory vegetation. While fishers are associated with late-successional conifer forests, they also use younger stands, especially as foraging habitat. Furthermore, the majority of fishers in western Washington tend to be found in areas less than 1800 m in elevation.

27 Since the majority of Tacoma Lands within the watershed are less than 1800m, they provide the best long-term opportunities for habitat recovery for the fisher. However, Tacoma's claim that fisher habitat will improve under the proposed action is questionable. The HCP states that it "will have positive effects on the Pacific fisher by reducing disturbance to denning fishers, increasing riparian protection, and managing for late successional conditions; but overall the positive effect will be minor because few, if any, fishers are likely to occur in the HCP area."

28 Once again, Tacoma is claiming to create late-successional/old growth habitat through thinning with no scientific evidence that forests will be benefit from such treatments. Nowhere in the HCP does the Tacoma address the risks of thinning, such as windthrow. Thinning stands can expose them to wind, causing excessive windthrow and excessive opening of the canopy. How could this affect fisher habitat? Tacoma also does not discuss how entering younger stands will affect fisher foraging habitat.

29 Lastly, how can Tacoma claim that if the fisher "does inhabit any portion of the HCP Area, it will occur only in small numbers in the upper watershed" without any reference to surveys conducted in the past or to be conducted in the future. Tacoma cannot rely on chance sightings as an accurate indicator of species distribution across the landscape. If Tacoma is to adequately provide for the protection and, most importantly, the recovery of fisher in the Green River Watershed, Tacoma must actively monitor for species' populations and reproduction, habitat quantity, habitat and specific habitat components, habitat trends, and other goals and indicators. The proposed action alone is not sufficient to achieve recovery of the fisher in the watershed. We believe that the no-commercial logging alternative provides the best and most practicable option for fisher protection and recovery.

6. Unroaded Lands

30 The unroaded areas left in the watershed are extremely important. These ecological anchors are the largest blocks of intact forest, the most undisturbed streams and provide the greatest security habitat in the watershed. These include Kelly Butte (~14,000 acres) and two smaller areas (Friday Creek, McCain Creek) north of the Green River where the city owns land. Much of the former was protected by Congress when it established a Kelly Butte Special Management Area on the national forest lands in Lester, Sawmill and Rock creeks. This provides a core area for late-successional forest species conservation, but is not sufficient by itself. Plum Creek is aggressively logging its lands, adding to the importance of protecting forests on Tacoma lands.

While some of Tacoma's unroaded lands are allocated to the natural zone, we are still concerned with the proposed logging and roadbuilding in and adjacent to the Kelly Butte roadless areas. The lands remaining in the commercial zone between the Green River and Kelly Butte (sections 24, 19, 20) should be managed to restore a natural forest and eventually included in the natural zone. In the interim, designation of this area in the conservation zone would provide the flexibility to do the restoration work, with the clear objective of re-establishing late-successional forests in an unroaded condition. Additional areas in Champion Creek (section 28), Rock Creek and near Eagle Lake should be treated the same way. The unroaded lands along the Green River (sections 21, 27) should be designated to provide the maximum protection possible with the goal of acquisition of the timber rights as soon as possible.

7. Roads

Roads cause major problems for both fish and wildlife. No new roads should be allowed under the HCP. Even well designed and constructed roads will increase sedimentation and impact wildlife (see FEMAT report) by destroying and fragmenting habitat. The basin is so heavily roaded that it has caused incredible impact to both terrestrial and aquatic systems.

31

We strongly support the decommissioning of roads, especially in the area between the Kelly Butte Roadless Area and the Green River. A significant portion of the road mileage on Tacoma's lands is not needed for administration or access to other owners. These should be obliterated as soon as possible. Ten years should be more than adequate. No additional road access to other ownerships should be granted by Tacoma across its lands.

8. Watershed Analysis

We are pleased that Tacoma will be participating in the watershed analyses scheduled for the basin. The federal watershed analysis has been completed and describes a seriously degraded watershed, with extremely high road densities and little late-successional forest. It is regrettable that the analyses prepared under state rules are limited to physical factors and direct impacts on fish. Cumulative effects are poorly addressed and the analyses do not consider terrestrial species or indirect effects at all. The City should insist that these other issues be addressed in these watershed analyses.

32

9. Riparian

Full protection of the riparian zones is critical to the success of the forest plan and HCP, the recovery of the salmon and other fish of the watershed and maintaining high quality water. While the proposed stream buffers (riparian management zones) were an improvement over the minimal state forest practices standards they are still far below that recommended by federal scientists (FEMAT report). Again, eliminating commercial logging will avoid these problems. There should be no further road building in any riparian zone, and an aggressive decommissioning of roads there commenced.

33

10. Timber Management

The current plan allows considerable commercial logging. The conservation zone still has a 100 year harvest cycle for the conservation zone, with annual harvest acreage of 80 acres. While contiguous even-aged (clearcut, shelterwood) units at 40 acres are below state standards, these practices should be eliminated entirely.

34

The deferral on logging the recently acquired federal lands in the natural zone should be permanent. We have also encouraged the City to acquire the timber rights held by Plum Creek along the Green River as soon as possible, especially in the Kelly Butte roadless area, to implement the Utility's conservation strategies.

Alternative B strategies go to great lengths to try to mitigate for the impacts of additional logging and road building. Most of these would be moot if the HCP just eliminated commercial logging on the City's lands in the watershed. For example, salvage logging for safety near roads would be unnecessary if the road no longer existed. Standards for restoration projects could be patterned on the Seattle's Cedar River Watershed HCP.

35

Proposal: Alternative C modified- No Commercial Logging, Reduced Roads

We propose that the USFWS and the City of Tacoma adopt a "no commercial logging" standard as reflected in Alternative C, with some modification. This alternative should be amended by a provision of

36

no new roads, and specifying substantial road decommissioning. The list of mitigation measures for individual species, under Alternative C (Table 2-18b) appears to allow considerable development. This should be curtailed. Acquisition and preservation of additional forest lands should be required to mitigate for impacts of Tacoma's facilities and operations that have destroyed or degraded late-
36 successional forest habitats for any species noted in the HCP.

The entire land base, other than under the power lines, should be allocated to the natural zone. In recently clearcut areas that are currently in the commercial zone, short term use of the conservation zone prescriptions might be used. These thinning operations in "plantations" should end within five years, and road obliteration commenced in those areas.

Even with the minimum standards established in the plan, the adaptive management approach will
37 require a high degree of caution in order to adjust the forest management and mitigation to address unforeseen circumstances. Monitoring the early management activities is essential to determine if they are providing the benefits expected within the limits of environmental impacts allowed.

Public involvement should be actively solicited for any watershed activities, including restoration
38 projects. The HCP should establish an accountable process for citizens to become involved in decision-making for the watershed *before* plans are realized.

Tacoma can and should develop and implement creative funding alternatives that do not include such destructive activities as commercial logging. Many alternatives could be considered, for example:

- a minimal rate increase
- adjusting rate structures (e.g., adding additional higher priced tier for high summer use)
- a summer surcharge for commercial customers
39 - corporate donations

Once again, the proposed HCP Tacoma Water Department's Green River Habitat Conservation Plan provides a prime opportunity for the City to provide the best possible long-term protection of its lands, the water and the fish and wildlife dependent upon these resources. This opportunity will be missed if the City continues to rely on commercial logging of its forestlands in the upper Green River watershed. Ending logging and other improvements to the forest plan must accompany, not substitute for improved fish and flow provisions of the HCP, as addressed in other parts of these comments.

Thank you for the opportunity to comment on the Simpson HCP, DEIS, and ITP.

Sincerely,

Jasmine Minbashian
Conservation Director
Pacific Crest Biodiversity Project
4649 Sunnyside Ave N. #321
Seattle, WA 98103

Also for the following organization:
Dave Werntz
Director of Scientific Programs
Northwest Ecosystem Alliance
1421 Cornwall Ave, Suite 201
Bellingham, WA 98225

Date: 04/03/2000 7:24 AM
Sender: Tim Romanski
To: Jon Hale
Priority: Normal
Subject: Fwd:Comments on the Green River HCP

Author: Tim Romanski at 1PO-OLES
Date: 04/03/2000 7:24:08 AM
Priority: Normal
To: Jon Hale
Subject: Fwd:Comments on the Green River HCP
Forwarded w/Changes
Author: Friends of the Earth NW <foenw@wolfenet.com> at FWS
03/31/2000 4:05:37 PM
To: tim_romanski@fws.gov at FWS
To: michael.grady@noaa.gov at FWS
Subject: Comments on the Green River HCP

Forward Header
Subject: Comments on the Green River HCP
Author: Friends of the Earth NW <foenw@wolfenet.com>
Date: 03/31/2000 4:05 PM

Gentlemen,

Attached are Friends of the Earth's comments on the Green River HCP.

Eric Espenhorst
Friends of the Earth, NW Office
6512 23rd Ave NW #320
Seattle, Wa 98117
206-297-9460
206-297-9468 fax
(See attached file: TacomaHCP.doc)

TacomaHCP.doc

March 31, 2000

John Kirner, Tacoma Water Department
by fax and e-mail

Re: Tacoma Green River HCP

Dear Mr. Kirner:

1 Friends of the Earth (FoE) thanks you for the opportunity to comment on Tacoma's Habitat Conservation Plan Draft Environmental Impact Statement (DEIS). FoE has more than 20,000 members nationwide who support our mission to protect the planet from environmental degradation, preserve biological, cultural, and ethnic diversity, and empower citizens to have an influential voice in decisions affecting the quality of their environment and their lives.

2 Tacoma, Seattle, and the Army Corps of Engineers should jointly conduct an environmental impact statement on the cumulative effects of the Howard Hanson Dam modifications, Tacoma HCP, and Seattle-Tacoma Intertie-Second Supply Project. These projects are inextricably intertwined, and the sponsors must analyze the projects for cumulative effects on salmonids, growth in the region, beneficial water uses, and other topics identified in scoping. This analysis must occur before the projects begin, and the sponsors must incorporate all measures to avoid, minimize, and mitigate the projects.

3 The agencies should not grant the HCP because Tacoma is not meeting the requirements to avoid, minimize, and mitigate for effects. Because it proposes to continue all current activities, Tacoma makes no effort to avoid impacts. In order to minimize impacts,
4 Tacoma must, but is not, adopting an aggressive water conservation program to reduce water use and thus withdrawals from the Green. Lastly, Tacoma must fund all habitat
5 acquisition, enhancement, protection, and restoration to mitigate for the disruption to properly functioning habitat caused by the dams and withdrawals.

6 DOE has closed the Green River to withdrawals. Tacoma should not be withdrawing more water without a thorough review of water rights in the basin, IFIM studies, as well as flow-survival studies for salmonids in the Green.

7 NMFS has not established PFC for instream flows and should not agree to the HCP. Instead, the agency should address all concerns raised in *Using Science in HCPs* by the American Institute of Biological Sciences and the National Center for Ecological Analysis and Synthesis of Habitat Conservation Plans. The 1999 study highlights the need for improved protection for endangered species. In *Using Science in HCPs*, 119 independent scientists examined 43 HCPs in detail and another 208 more generally. The report concludes that critical scientific information about endangered species often is not available for HCPs. It also highlights a major lack of biological monitoring to determine what effect each HCP has on endangered species. The report also finds that HCPs often rely upon unproven management techniques, posing risks to species.

8 Furthermore, NMFS may lack authority to agree to the HCP. In the Federal Register notice for NMFS' HCP regulations, NMFS stated that the agency was not establishing generic authorization for HCPs for threatened species, and that authorization would be established case by case. See FR 55;97, May 18, 1990, pg. 20603 et seq. Arguably, NMFS would need to write ESA section 4(d) rules to authorize HCPs for other threatened salmonids. Furthermore, 50 CFR 227.21(b), which extends ESA section 10 "take" authorization to species covered by 50 CFR 227.21(a). 50 CFR 227.21(a), in turn, states, in effect, that the prohibitions of ESA section 9 apply to threatened salmon species listed in 50 CFR 227.4(f), (g), (h), and (i). Those species are, respectively, Snake River spring and summer chinook, Snake River fall chinook, Central California ESU coastal coho, and Southern Oregon/Northern California ESU coastal coho. Thus it would appear NMFS lacks the necessary authority for species other than those listed here and should not agree to an HCP for Puget Sound chinook salmon.

9 I requested a copy of the HCP and DEIS from John Kirner months ago, and never received a copy. Please send me a copy of the HCP and DEIS as soon as possible. When available please send me the final HCP, final EIS, and any other changes.

These comments focus on financial opportunities available to Tacoma to finance the protection and restoration elements suggested by the Sierra Club, Mountaineers, Pacific Crest Biodiversity Project, other environmental, conservation, recreation, and citizen groups. In its capacity as co-manager of Green River water and salmon, the Muckleshoot Indian Tribe will make recommendations for projects that also should be funded from the opportunities discussed in this letter. These comments are based on anlaysis of financial statements of TPU's water utility (Water Division 1998 *Annual Financial Report*) as well as information on watershed management (*City of Tacoma's Green River Watershed Forest Land Management Plan* July 1, 1996), and timber revenues and costs provided in response to information requests from Pacific Crest Biodiversity Project.

10 Tacoma should increase its system development charges (SDC) to pay 100% of the costs of system developments, up from the 30-35 % currently planned according to the 1998 Financial Report, page 47. Tacoma should make sure that the SDC for hookups outside urban areas reflects the costs to serve those areas. These changes will create rate equity whereby new ratepayers are paying the costs to serve them and encourage urban infill. Furthermore, some of the revenue that cross-subsidizes growth should fund water conservation and properly functioning conditions in the Green River Basin.

11 Tacoma should ensure that revenue collected for depreciation costs are used to either pay down debt or fund capital projects. Otherwise, future ratepayers will be saddled with a financial liability, and/or debt burden, and a system that requires major capital overhaul. To provide an additional incentive for water conservation, TPU should collect depreciation funding through a summer rate surcharge from all customer classes.

12 Tacoma also must change its rate structure to provide greater incentives for water conservation. All customer classes should pay a higher summer rate. The residential rate encourages lawn watering and other wasteful uses of water during the summer because the first rate block is five times the size of the winter rate block for the same rate according to Tacoma's *Water Rates and Regulations for the Supply and Use of Water*, April 7, 1997. Tacoma's maximum day demand is less than twice average day demand (72 mgd and 123 mgd respectively, according to *Central Puget Sound Regional Water Supply Outlook*, February 2000, Table 4). Consequently, very few of Tacoma's residential customer are likely to see the rate incentive to reduce summer time water use.

13 The revenue from any timber program is impossible to determine, and any claims in the HCP and DEIS about that revenue have no foundation and cannot and do not support any decisions or any alternative. The Financial Report does not provide a line item or note for timber revenue and watershed management costs. The line-item "Other Operating Revenue," which I presume is all or partially timber revenue, has ranged from a low of $354,366 to a high of $789,823 during the past 10 years with no clear trend. Based on records requests for watershed timber sales for the past 20 years, from 1981 to 1985 the utility conducted no timber sales, and during the previous 10 years, timber revenue has generally been less than $200,000 per year.

14 Even in the highest, speculative case, timber revenue is 2.6% of total utility revenues and is a small price to forgo to provide the greatest possible protection to drinking water quality as well as aquatic resources. When combined with other financial reforms, Tacoma should use this process to encourage urban infill and redevelopment per the Growth Management Act as well as protect the environment and properly functioning conditions in the Green per the Endangered Species Act.

Please keep this office informed as to developments in this matter. If you have any questions, feel free to contact me.

Sincerely,

Eric Espenhorst

cc: USFWS, NMFS

NG0-10

March 30, 2000

[illegible] 3 2000

Tim Romanski
U.S. Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

Re: 1. Draft Tacoma Water Habitat Conservation Plan DHCP) (December 1999);

2. US Fish & Wildlife Service & National Marine Fisheries Service Draft Environmental Impact Statement (DEIS) for the Proposed Issuance of a Multiple Species Incidental Take Permit for the Tacoma Water Habitat Conservation Plan, Green River Water Supply Operations, and Watershed Protection; and

3. Implementing Agreement for the Tacoma Water Division, Tacoma Public Utilities Habitat Conservation Plan for the Green River, (King County) Washington, Municipal Water Supply

Dear Mr. Romanski:

This letter consists of the comments of Sierra Club's Cascade Chapter, on the City of Tacoma's Habitat Conservation Plan, specifically on the three documents listed above. Sierra Club, one of the largest environmental organizations in the country with approximately 500,000 members, and its Cascade Chapter (most of Washington State) with approximately 20,000 members does appreciate the opportunity to comment on the proposed action. We request that the Chapter be kept informed about the progress of the proposal and that we receive copies of any biological opinions and other decision documents associated with this proposal. Sierra Club has long been involved in issues related to forests, salmon and other fish and wildlife, instream flows and municipal water supply, and regularly comments on HCP's. Sierra Club is also a recreational organization, offering many outings through National Sierra Club, its Chapters, and the Groups that make up the Chapter.

1

Sierra Club, Cascade Chapter, respectfully requests that the Services read all of our questions and comments carefully and answers/responds to each. It is our belief that the ESA mandates that your role is one of protector and restorer of ESA listed species, not of municipal water supply or of the budget of the proponent of this HCP. We expect you to be unswerving in your pursuit of protection and restoration of the species whose fate rests in your hands. Do not delegate that responsibility to the City of Tacoma where there is any doubt that they can and will protect and restore these species even at great cost to themselves.

I. ISSUANCE OF A TAKE PERMIT IS INAPPROPRIATE

SHOULD THE SERVICES ISSUE THE TAKE PERMIT TO TACOMA WHEN IT IS INAPPROPRIATE UNDER ESA BECAUSE IT IS VERY WEAK IN MEETING THE REQUIREMENTS OF THE ESA, INCLUDING THE REQUIREMENT THAT THE DELINEATED SPECIES BE RESTORED?

2 Sierra Club is opposed to the widespread practice of issuing permits to "take" (harm, kill, destroy) species listed as endangered or threatened under the federal Endangered Species Act (ESA) and their habitats across large pieces of land. Issuing an Incidental Take Permit (ITP) to a landowner such as Tacoma who must bear much of the responsibility for the imperiled species' reaching imperiled or threatened status is particularly objectionable for us. Even more so, where the HCP does not provide meaningful and adequate mitigation for many species on those lands and in their waters, such as in the present case. ITP's/HCP's are only to be used in "limited circumstances," according to the HCP regulations of the US Fish and Wildlife Service (USFWS) as indicated in the Federal Register. Sierra Club, Cascade Chapter recommends that USFWS and National Marine Fisheries Service (NMFS) (the Services) use various alternatives to ITP's, which these comments will enumerate later.

SHOULD TACOMA BE GIVEN A "NO SURPRISES" GUARANTEE FOR ITS HCP WHEN THERE ARE MANY UNKNOWNS TO BE DISCOVERED AND THE "NO SURPRISES" GUARANTEE ACTS AS A DISINCENTIVE TO REACHING RESTORATION GOALS?

Sierra Club is very disturbed by and opposed to the "No Surprises" guarantees which are routinely given to timber companies, developers, and others in conjunction with their
3 ITP's. Sierra Club supports and promotes incentives for non-federal landowners to restore habitats and fish and wildlife populations above levels generally required by law, "No Surprises" assurances act as disincentives. They encourage proponents such as Tacoma to fight to lock in HCP's which permit the same practices that brought the listed species to face extinction. While HCP's do sometimes provide some degree of mitigation -- above what might otherwise happen -- such measures are generally very inadequate in getting to the goal of restoration of the species. In the present case, while Tacoma offers to do certain salmon habitat restoration projects, they plan to have covered by the HCP other actions such as increasing -- doubling -- the amount of water storage behind the Corps of Engineers' Howard Hanson dam to the detriment of those same salmon. In effect, such HCP's/ITP's give parties such as Tacoma, with a long history of harmful impact on a number of species with a free pass to avoid their responsibility to get to the goal of restoration of habitats they degrade and the species that use them.

SHOULD TACOMA BE GIVEN AN ITP WHEN ITS HCP WOULD NOT ADEQUATELY PROTECT ALL OF THE SPECIES IT COVERS?

4 The issuance of Tacoma's proposed HCP and ITP would be totally inappropriate because of its impacts on salmonids in particular, but on all the 32 species listed as the subject of

this HCP. For the reasons spelled out herein, Sierra Club objects to the issuance of the ITP.

II. ISSUANCE OF A TAKE PERMIT MAY BE PREMATURE

A. DOES NMFS HAVE AUTHORITY UNDER 50 CFR 227.21(B) TO ISSUE ITP'S FOR EACH SALMONID SPECIES DEALT WITH IN THIS HCP?

4

B. HAVE ESA SECTION 4(D) RULES BEEN WRITTEN AUTHORIZING ITP'S FOR THIS EVOLUTIONARILY

SIGNIFICANT UNIT (ESU) WHICH FOR GREEN-DUWAMISH WATERSHED CHINOOK SALMON IS THE PUGET SOUND CHINOOK ESU? LIKEWISE, HAVE ESA SECTION 4(D) RULES BEEN WRITTEN AUTHORIZING ITP'S FOR THE EVOLUTIONARILY SIGNIFICANT UNIT FOR GREEN-DUWAMISH WATERSHED BULL TROUT? IF NOT, ISN'T IT PREMATURE FOR THE SERVICES TO WORK ON TACOMA'S HCP AND ISSUE AN ITP?

C. ISN'T IT PREMATURE FOR THE SERVICES TO WORK ON TACOMA'S HCP AND ISSUE AN ITP FOR THE THREATENED SPECIES COVERED BY THE HCP?

5

The Federal Register Notice (federal Register 55;97, May 18, 1990) for NMFS' rules governing ITP's and HCP'S notes that "TAKE" permits are not generically authorized for threatened salmon species, and that ESA 4(D) rules must be written to provide such authority.

D. SINCE ITP'S SHOULD NOT BE ISSUED FOR SPECIES UNTIL THEY ARE LISTED, ISN'T THE PROPOSED DECISION TO ISSUE AN ITP FOR OREGON SPOTTED FROG, COHO SALMON, SOCKEYE SALMON, CHUM SALMON, STEELHEAD, AND OTHER SPECIES PREMATURE?

6

Tacoma wants the HCP to cover 32 species, most of which are treated as "species of concern," such as Coho, Chum, and Sockeye salmon and Steelhead. The Oregon spotted frog is treated as a "candidate" for ESA listing. The analysis for these species' needs, the factors of decline, etc. is weak and incomplete at present.

ADAPTIVE MANAGEMENT AND NO SURPRISES

7

As indicated elsewhere in this Document, what is proposed in the HCP is not really Adaptive Management because it allows Tacoma off the hook. Tacoma must face up to its responsibility, as must other players in this Watershed. This is not a game of Pretend. The threatened and endangered species discussed here are real and they need all our efforts toward the goal of recovery.

7 True adaptive management involves creating scientifically quantifiable goals, monitoring and making necessary changes to meet the goals. This HCP's approach could allow any potentially impacting project to continue if properly implemented. This HCP is especially weak with setting proper goals and committing to the necessary changes.

8 Tacoma will not reduce withdrawals of water from the river later unless it is agreed to in the documents.

Not even if it becomes obvious later that withdrawals must be reduced. Not even if Tacoma has other sources of water. Not when Tacoma can spend what it wants and do what it wants with No Surprises.

9 Adaptive management would allow the information to be collected and changes to be made that are necessary for resource protection. This would entail a combination of hypothesis testing, setting quantifiable biological goals, monitoring and implementing the necessary changes to achieve a desired outcome.

10 The HCP does not set the quantifiable biological goals necessary to initiate adaptive management and even if such goals were developed, Tacoma is not committed to implementing the changes that are above a predetermined cost or involve lowering their water withdrawals. This makes it impossible to initiate proper adaptive management as described in the Services guidance documents; Coastal Salmon Conservation: Working Guidance for

Comprehensive Salmon Restoration Initiatives on the Pacific Coast (NOAA 1996) and An Ecosystem Approach to Salmonid Conservation (Spence et al, 1996).

11 Solution: Financial commitment to a scientifically defensible adaptive management process and implementing the needed changes to the Habitat Conservation Measures (HCM) or reducing water withdrawals.

In 1996, scientists of the National Marine Fisheries Service produced a document to guide salmon conservation efforts on the west coast. Coastal Salmon Conservation: Working Guidance for Comprehensive Salmon Restoration Initiatives on the Pacific Coast (NOAA 1996) provides direction for developing a coherent strategy for averting extinction of salmon and for rebuilding these seriously depleted stocks. In this guidance, NMFS outlines three components of a successful conservation strategy:

1. Substantive protective and conservation elements;

2. Certainty of implementation of the elements;

3. A comprehensive monitoring program.

Furthermore, because many of our action will proceed in the face of uncertainty, the NMFS advocates for an adaptive management approach to all conservation actions.

The elements and objectives of this conservation strategy are discussed briefly in the 1996 guidance and are elaborated in a companion document entitled An Ecosystem Approach to Salmonid Conservation produced by Spence et al (the ManTech Report). ManTech provides a synthesis of work on salmonid ecology and more explicitly defines the ecosystem and adaptive management approach that form the basis of the conservation strategy. If this strategy
11 and approach are robust, the principles and objectives that comprise the approach can be used as a template against which to compare any and all conservation efforts—including Habitat Conservation Plans--and assure that these efforts form a coherent program for conservation.

Three types of monitoring activity are necessary to assure that the conservation activities proposed are successful in meeting the goals established for them in the HCP (chapter 2):
implementation monitoring (called compliance monitoring in the HCP); effectiveness monitoring (the project accomplished its objectives); and validation monitoring (the actions were the "right" ones to meet the goal of conservation). The third type is the most difficult since it requires the development of measures that can track ecosystem characteristics over many years.

Compliance Monitoring
In the HCP, most elements of the compliance monitoring program are clear and well-conceived. Conservation measures are tied to criteria for
12 evaluation, methods and monitoring frequency are specified, and the reporting mechanism is provided. Less clear are some of the contingency measures should the activity not meet design or longevity standards. This is particularly problematic for the suite of instream flows proposed in the HCP and summarized in Table 6-1. Will these contingencies be developed through the inter-agency task force described elsewhere in the HCP?

Adaptive Management

There are further concerns for many of the habitat enhancement
13 activities as well. The contingency calls for event-based inspection following year 5 for large woody debris and side channel restoration but makes only a single commitment to repair if the action fails in years 6 to 50. This is contrary to the objectives of the HCP and inconsistent with the relief from take for the 50-year life of the HCP. Some provision must be

13 made for further management to assure compliance.

Effectiveness Monitoring

The intent of this type of monitoring is to assess the success or failure of a particular activity or project at meeting its objectives. To that end, the objectives of the action must be made clear and quantitative. Ideally, all conservation actions, whether passive (the protection of wolf dens and eagle nests) or active (large woody debris placement, side channel restoration, or flow management), would have clear and measurable objectives tied to the ecosystem benefits described in chapter 2. For example, gravel nourishment
14 to compensate for lack of transport might have the following objectives: prevent further channel incision in those reaches where transport has exceeded deposition; and provide spawning substrate in reaches where mean sediment size has increased due to reduced gravel recruitment. Associated with these narrative objectives, quantifiable measures and timeframes related to the action must be developed. It appears from Table 6-2 that these objectives are needed for virtually all the habitat-related and flow-related management actions described in the HCP. We suggest translating the ecosystem benefit narratives into objectives consistent with the habitat elements approach advocated by the NMFS in the conservation guidance.

15 Moreover, some evaluation or reference criteria will be necessary to measure against; we suggest that the "Properly Functioning Conditions" approach described in the conservation guidance provides a useful starting point.

Validation Monitoring

This is a crucial but often overlooked type of monitoring. This is intended to measure the appropriateness of the conservation measures to achieving the goals of the conservation plan. It appears that the research commitments made in the HCP (Table 6-3) lean in this direction. However, the elements of the research program seem to be a mix of baseline work and monitoring,
16 and are somewhat confusing. For example, measure RFM-02 A appears to be effectiveness monitoring and should be addressed in that section. These elements should be separated for more clarity, and the monitoring elements tied to conservation goals and objectives. Again, quantifiable measures are necessary for evaluation of the data obtained from this work. Almost no of the elements in table 6-3 can be considered validation monitoring according to the definition given in ManTech. This must be addressed in the HCP to insure long-term system viability.

Adaptive management is not simply the passive use of experimental
17 information in management; more usefully, adaptive management structures actions and activities explicitly to obtain needed information. How are the conservation actions called out in the HCP meeting that intent? Particularly

17 those actions that carry an uncertain outcome?

WORKING AT CROSS PURPOSES

18 The Citizens of King County and its Cities will be charged with the responsibility of achieving recovery of Chinook salmon (and other salmonids), but our ability to succeed is lessened by the presence of the dams which block habitat and interfere with natural hydrology, and by the lessening of instream flow due to Tacoma's water supply withdrawal. We are also impinged by Tacoma's plans to increase water supply storage in the Corps' dam's reservoir. Unless Tacoma and the Corps maximize their efforts there is
19 no way we can succeed in our efforts. If Tacoma gets its way, we will be impeded by a number of preexisting conditions that Tacoma made worse by insisting on continuing its wasteful ways with water.

PIECEMEALING AND FRAGMENTATION OF RESPONSIBILITY

20 This HCP should deal with related issues and projects as if they were part of a whole. Tacoma should not be allowed to continue breaking off pieces and projects to make it more difficult to get the City to act responsibly.

21 The Habitat Conservation Measures covered in this HCP could be rendered meaningless because of the lack of complete review of projects such as the AWSP, the Second Supply Project, and the proposed Muckleshoot Hatchery at the same time. For example, many of the conservation measures in the HCP are reliant on successful implementation of the Additional Water Storage project by the Corps of Engineers. Given that the Corps has not completed its Section 7 consultations with NMFS and USFWS, and that the consultations will deal with a greatly reduced species list in comparison to the HCP, it is difficult to review the HCP at this time and be confident that successful implementation of the measures is certain. Concurrent review of this HCP and the Corps' Section 7 biological assessment should be done by the Services. Perhaps the adaptive management section of this HCP should include a "re-opener" on flow management whenever the Corps is
22 required to consult with the Services on newly listed species in the future. Thus, flow requirements for both Tacoma and the Corps could be reconsidered by the Services when new listings occur.

23 On page 3-9, the HCP states that Tacoma will not be obligated to fulfill its flow management commitments in this HCP if natural or operational changes at Howard Hanson Dam result in a revised Corps mandate (including even a "change in USACE policy or management direction"). This approach makes reliance on flow management for HCMs 1-01, 1-02, and particularly 2-02 difficult. At a minimum, any such changes by the Corps should be cause to re-open this HCP under the adaptive management structure. In addition, many measures in the HCP are required by the agreement between Tacoma and the Muckleshoot Indian Tribe. Review of the HCP is difficult without full documentation of the provisions of the agreement. In particular, HCM 2-05, introduction
24 of juvenile fish into the upper watershed, appears to be reliant on construction and operation of a new hatchery on the Green River, which is a component of the agreement

24 with the Tribe. Full review of this hatchery's effects on Green River salmonid conservation should occur under this HCP.

This HCP is presented as a package of actions that are tied to successful implementation of the Additional Water Storage Project by Tacoma and the Corps, with accompanying mitigation measures and resultant commitments to the Muckleshoot Indian Tribe. Please
25 clarify how this document will be applied if one or more of the following occur:

1. The Additional Water Storage Project is not completed. How will the measures in this HCP be applied if the Second Supply Pipeline is constructed but water is not stored at Howard Hanson to augment flows?

2. The second diversion water right is not implemented. How will the measures in this document be applied to the first right? Presumably Tacoma
26 will be operating under a take prohibition as soon as the Section 4(d) rule is published; at this time, it is likely that only the first right will be implemented.

WATER: INSTREAM FLOWS

A fish without the water it needs cannot be saved by dam modifications, Large Woody Debris, tree plantings, etc. Tacoma offers to do various habitat restoration projects, while at the same time the City proposes to take away more water with a second water diversion. It offers to make dam improvements while proposing to take away from the river's natural high flows by doubling water storage to accommodate Tacoma's water supply enhancements. And Tacoma doesn't even need the water. Tacoma's HCP does not provide for reductions in Tacoma's water withdrawal so the total 213 cfs water withdrawal will be locked in for 50 years. This loss of 22% of the base flow in the Green River reduces the chance of survival for all of the 32 species Tacoma proposes for "take" coverage.

27

This HCP does not fully assess the basic impact of removal of up to 213 cfs from the Green River on a routine basis. This flow diversion – the implementation of Tacoma's first and second water rights – represents approximately 22% of the mean annual flow at Palmer. In addition, the HCP does not clearly delineate flow-related impacts of the first right vs. the second right. Depending on the timing of construction of the Second Supply Project, part of the operational period of the HCP may occur prior to the second right being implemented. It is impossible to determine whether mitigation for incidental take relative to the first rightvalone is sufficient.

In addition, because most of the downstream impact analysis in the HCP is based on the IFIM methodology, basic potential impacts of these flow diversions such as alteration of
28 wetland and floodplain hydrology, impacts to Green River water temperatures, etc. are not evaluated. What effect will removal of 213 cfs on a routine basis have on groundwater tables throughout the Green River valley? How will this affect recharge? Wetlands? In addition, the adaptive management approach is not comprehensive in that

29 no provision is made for reallocation of flow back to the river if monitoring proves it to be a necessary component of salmonid recovery in the Green River watershed. While adaptive management of flow releases using water stored in the Spring is useful, in order for a 50-year incidental take permit to be issued, some sharing of risk between water supply and fisheries may be appropriate.

30 Further concerns are for divergence from the natural historic high flows of the Green River. The recent past has brought flood control, vast development on the flood plain, and a present inability to undo what has happened to that flood plain. The additional water diversion and the additional water storage project play havoc with the natural hydrologic patterns, perhaps more so with the high flows than the low flows. This effect on the river cannot but impact the fish stocks that evolved in it. Add the impacts of the dams, and the changes due to over-logging and of huge amounts of impervious surfaces brought by land use changes and growing populations, and the fish may wonder if they are in the right river.

Tacoma notes in the HCP that the Upper Green River Watershed is a key to salmon restoration and recovery.

31 Yet, the North Fork Green River Well Fields in the Upper Watershed, part of Tacoma's water suply and diversion plan de-water a major tributary which would be expected to provide habitat needed for restoration. Those impects are not dealt with. There is no analysis of those effects.

TACOMA'S PROPOSED GREEN RIVER HCP
COMMENTS ON FISH AND AQUATIC HABITAT
SIERRA CLUB, CASCADE CHAPTER, MARCH 31, 2000

OVERVIEW

Tacoma's HCP lays out a small amount of information on the 11 Anadromous fish species for which the City seeks ITP coverage but falls short on analysis and on
32 qualifying for an ITP under the requirements of the ESA. Fortunately, the Services' DEIS provides more information. As far as the two recently listed ESA species, Chinook Salmon and Bull Trout, are concerned, there are problems in a number of areas. For that matter, the same is true for all of the potentially covered fish species.

AQUATIC HABITAT: ECOSYSTEM VIEW

Sierra Club shares the concerns of the Center for Environmental Law and Policy (CELP) regarding the failure of the DHCP and DEIS to do any analysis of the needs of the Green River's fish stocks in terms of a total ecosystem approach. Sierra Club herein adopts and incorporates by reference the section of CELP's Comment letter on the DHCP and DEIS
33 regarding this concern, which are based on documents by D.T. Castleberry, D. Mather, and Holly Coccoli. Sierra Club shares the concerns of CELP and the three writers that many factors are interrelated. For instance, the DHCP and DEIS do not deal with the presence or lack of insects in the various sub-basins of the Green-Duwamish Watershed and what effects the absence or low count of historically present insects would have on the ecosystem and thereby on the fish species that Tacoma wants covered in the HCP.

THE DAMS: UPSTREAM PASSAGE

The Tacoma dam has blocked fish from moving upstream into the upper watershed since the early 1900's. When the Army Corps of Engineers (ACE) built the Howard Hanson flood control dam (HHD) in the 1960's about 3.5 miles upstream, no fish passage was built on HHD because there was none on Tacoma's dam.

For a number of years, various parties, including the Muckleshoot Indian Tribe (MIT), have urged Tacoma to allow anadromous fish into the Upper Watershed. Tacoma had
34 resisted because of water quality concerns related to spawned out fish carcasses upstream from Tacoma's water diversion. Tacoma agreed to allow a small number of anadromous fish into the Upper Watershed beginning in 1982.

Tacoma has decided fairly recently that they are no longer so concerned with possible contamination of their drinking water supply from spawned out fish carcasses (unless the number of fish gets high), and has been working with the Muckleshoot Indian Tribe and others, experimenting with trucking anadromous salmonids above the two dams to

34 tributaries where they can spawn. However, the juveniles do not make it downstream past the reservoir and the dams which have been killing 92% of any juveniles trying to
35 move downstream of the dams. There is no analysis in the HCP of what factors might be responsible for the high rate of mortality.

The Tacoma HCP's unexamined proposal for Upstream Passage is for Trapping and Hauling fish to get them above the dams. This proposal includes a fish ladder for upstream passage past Tacoma's diversion dam. This fish ladder goes immediately to a trap, holding, and transfer facility. [HCP, p. 4-35] The fish are then trucked to tributaries above HHD.

There is no data and no analysis in the HCP regarding Upstream Passage. There are no citations to other studies regarding Upstream Passage. The long list of references in Chapter 10 of the HCP contains nothing readily discernible as being related to Upstream Passage, although there are several references obviously related to Downstream Passage. There is no data and no analysis for Upstream Passage which includes a fish ladder to get fish past HHD. Tacoma and others have indicated that HHD, at 235' high, is too high for success in getting fish past the dam via a fish ladder. Tacoma and ACE say that such a
36 long fish ladder would be too expensive. Their position is that there are no other dams in Western Washington that are as high as HHD for which there is a successful fish ladder. Even if that were true, technology and understanding of the needs of anadromous fish continue to improve over time. Unsuccessful fish ladders may not have been unsuccessful if built with today's technology and understanding of fish needs. The City of Tacoma, Tacoma Public Utilities, Tacoma Power Division is studying changes to the Mayfield Dam on the Cowlitz

River, including a possible fish ladder on a dam which, at 188 feet high, is almost as tall as HHD, at 230 feet high. Considering that the relevant vertical distance should be calculated to the level of the reservoir and not to the top of the dam, the height difference between the two dams could be inconsequential. This fish ladder would include an adaptation to accommodate fluctuating levels of the reservoir where the ladder ends. Such an adaptation would also be applicable for HHD.

There is no data and no analysis of how well Trap and Haul would work when several anadromous fish stocks are making their way upstream at the same time. There is no
37 analysis of how many fish might actually be allowed to be trucked upstream given Tacoma's sensitivity to water quality considerations including taste and smell of drinking water from the Green River.

THE DAMS: DOWNSTREAM PASSAGE

Tacoma will work with the Army Corps of Engineers (ACE) to improve downstream fish passage at each dam, but, according to the "Tacoma HCP Draft Synopsis Comments of
38 WRIA 9 Technical Review Panel, March 2000," Tacoma estimates that the new passage system will still result in killing 36% of the chinook that try to pass downstream of HHD. A mortality rate this high does not bode well for Upper Watershed recovery

38 efforts and increasing of total Watershed habitat by opening up fish passage to the Upper Watershed. This is especially true if Tacoma limits the number of fish from each species which may go above the dams.

39 The modifications to the two dams that are noted in the HCP carry no guarantee of improving substantially the survival rate. Also, improvements to the dams go with the Additional Water Storage Project (AWSP). The reservoir is currently enormous from a juvenile salmonid's point of view. Since these fish evolved before the dams were built, they were not genetically programmed to find their way through a reservoir with its decreased flow rate, different water temperature, etc. This may be a major part of the problem with downstream passage. At present, there is not sufficient data to know fully what the problems are for downstream passage, despite much study of the problem.

ADDITIONAL WATER STORAGE PROJECT

40 The AWSP will more than double the amount of water stored in the reservoir at certain times of the year and make the pool even more difficult to get through than at present. Since the AWSP is a joint project of ACE and Tacoma, it needs to be considered in any discussion of Tacoma's EIS. The AWSP is for the benefit of Tacoma, since the additional water storage would be almost entirely for Municipal Water Supply. The attempts by Tacoma to separate the AWSP from the City's HCP raises questions of responsibility, certainty, and comprehensiveness. Many of the conservation measures in the HCP rely on successful implementation of the AWSP by the Corps of Engineers. How can the public know whether successful implementation of the measures is certain to happen?

HATCHERIES

41 Tacoma's HCP informs us that Tacoma will help MIT build a new Hatchery. Then the City tells us that the Hatchery is really not part of the HCP. The Hatchery agreement with the Muckleshoot Tribe IS tied to the HCP, because it is tied to the Second Supply Project, which Tacoma seeks to have protected from ESA "take" provisions under the ESA. Also, if the HCP does not get implemented, the Second Supply Project would be unlikely to go forward, and the Hatchery deal would not go forward, either. In any case, the Services should consider the proposed new hatchery in terms of Cumulative Effects because of the impacts of hatcheries, even with newest models.

42 The upper watershed should be reserved for natural production of wild fish stocks. Tacoma will assist the MIT with the hatchery and intends to outplant the hatchery fry into the Upper Watershed. Tacoma should not be increasing the likelihood of turning the Upper Watershed into a hatchery fry rearing facility when this area may be the key to recovery for wild salmon. The Hatchery is very costly. It may or may not be ble to get the required permits. The Green River & its tributaries already have several hatcheries and certainly don't need another one. Hatcheries create problems for Wild fish. The new hatchery could:

-reduce salmon genetic integrity

-alter behavior of salmon

-increase harvest pressure on depleted wild populations

42 -displace wild salmon

-eliminate the nutrients from carcasses along the river

-produce fish which compete with wild salmon for food, etc.

Again, Tacoma is taking away from protection and restoration of wild chinook salmon and other wild stocks at the same time it proposes its own protection from "take" provisions in the ESA.

ALTERNATIVES ANALYSIS FOR FISH

Tacoma's HCP drags out 6 alternatives to the HCP's proposed Water Withdrawal that look like "straw dogs" and then proceeds to knock them down. Under Alternative 9.2.1 (No Action), Tacoma paints the following scenario:

--Tacoma doesn't get to withdraw additional water for water supply;

--Tacoma doesn't get to double the water storage at Howard Hanson dam;

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--Tacoma therefore doesn't get to receive an Incidental Take Permit;

--Tacoma will run out of water in 1 year;

--The Corps of Engineers will be deprived of doing the Additional Water Storage Project.

But in a more realistic scenario, Tacoma would still need an ITP because it would continue to withdraw water from the Green River via Pipeline #1.

Tacoma would not run out of water for many years, contrary to the HCP at p. 9-2, line 38. Tacoma's own Draft Comprehensive Water Plan Update, released in December 1998, gave no indication of imminent danger of not having enough water to accommodate new customers. Water purveyors, especially major ones such as Tacoma, do not suddenly run out of water unexpectedly. They look ahead a minimum of 10 years. Tacoma Water's 44 management has repeatedly indicated that they don't need the water from the Second Supply Project for a number of years. For the above document, Tacoma mentioned 22 alternative sources of water and listed a number of smaller untapped sources for additional water ready for use. Combining a few of those smaller sources such as aquifer recharge, with additional water from Tacoma's wellfields plus a big effort at conservation and water re-use, could keep Tacoma out of trouble for almost as long as the Second

Supply Project would. According to a January 2000 conversation with newly elected Tacoma City Councilman, Bill Evans, Tacoma has had very large debt problems recently. Apparently to help get the City out of debt, Tacoma Water has been trying to set up contracts with small purveyors nearby to sell them water from Tacoma. The implication is that Tacoma has water it does not needs.

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The Corps of Engineers would probably have to make changes to the dam structure and provide fish passage under the ESA, and would continue to add 5000 acre feet of water storage dedicated to fish needs (Sec. 1135 project). Tacoma is the Corps' partner in the AWSP. The purpose of that project is to store water for Tacoma's Water Supply purposes. The Corps would have no reason to do the AWSP and suffer no loss if it no longer had a project to do based on Tacoma' s Water Purveyor dreams of being an ever more powerful player among local governments and water purveyors.

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With the possible exception of Alternate 9.2.2, which might have some merit but needs a study to be looked at seriously, the other Water Withdrawal Alternatives are meaningless. They seem to be in the HCP because something has to be written down.

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The No Action Alternative is made to sound completely unviable in the HCP, but if Tacoma recognized the importance of working hard for recovery of ESA listed species and recognized the harm the City has caused by its activities in the Watershed for a hundred years, NO ACTION could be a viable Alternative. "No additional water withdrawal" is not bad for fish. It's true that Tacoma could refrain from enhancing instream flows if the City doesn't get it's "Preferred Alternative," but Tacoma could choose to protect those ESA species without insisting on an additional Water withdrawal. "No Additional Water Storage project" is not bad for fish either. The Corps already got authority to do its Sec. 1135 Surcharge Storage of 5000 acre feet of water for fish flows in Summer and Fall, so it is not likely that fish would be impacted more by a realistic "No Action" Alternative than by Tacoma's proposal, which brings a number of negatives for fish: almost double the water withdrawal; more than double the water storage which makes the downstream passage through the reservoir more difficult and devastates any chance of mimicking the historical, natural hydrology of the river; a new hatchery bringing detrimental hatchery interlopers into the Upper Watershed.

47

The Alternatives presented in the EIS meekly follow what Tacoma sets up in the HCP. The EIs frets about the No Active Alternative but doesn't mention that the Corps already has the authority to store water for fish to help alleviate possible problems. The EIS tries to do a better job of analyzing each Alternative than the HCP does, but does not seem to have all the necessary information and doesn't do the rigorous exploration and objective examination or include all Reasonable Alternatives as required by National Environmental Policy Act (NEPA).

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Sierra Club proposes a real, reasonable Alternative which would include Water ReUse and Conservation with reform of regional water rates to push citizens to conserve water. Conserved and ReUsed water are both considered by experts to be new sources of water. The existence of a "viable but unexamined alternative renders an environmental impact

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statement inadequate." [Alaska Wilderness Recreation & Tourism v. Morrison (67 F.3d 723, 729 (9th Cir. 1995)]

WHY DON'T THE SERVICES REQUEST AN ANALYSIS OF A CONSERVATION, RE-USE, AND SMALL SOURCES ALTERNATIVE AS A WATER WITHDRAWAL ALTERNATIVE?

49 There is a great amount of information on Conservation and ReUse including data that could show how rates effect behavior and yield conservation. People in other countries may use a third of the water we use here. We need the Services to stand up for Fish and require Conservation. Such an Alternative would answer the Services' concerns noted at the bottom of page 2-1 of the EIS. It would meet Tacoma's objective of meeting current and future water demands, and would not require speculative information. The Services should contact the State Departments of Ecology and Health for further information on how far Conservation and Re-Use could go in meeting Tacoma's needs and those of the Fish Stocks in the Green River.

FISH PASSAGE ALTERNATIVES

Tacoma's HCP offers no Alternatives for Upstream Passage of Anadromous Fish but Trap and Haul. There is a lot of information about Downstream Passage in the EIS but almost nothing about UPstream Passage. Even the huge list of References lists nothing about Upstream and lots about Downstream. Strangely enough, Tacoma Power just happens to have data and an analysis of a possible fish ladder being added to the Mayfield dam on the Cowlitz River. The Mayfield Dam is up for review by another federal agency, the Federal Energy Regulatory Commission (FERC). FERC has decided to stand up for fish in recent years and is asking for serious retrofitting and even removal
50 of hydroelectric dams in some cases where only a small amount of power is produced and the dam is a major problem for fish. There is an EIS for the FERC review and a separate document called the "Draft 90% Fish Passage Study, Cowlitz River Hydroelectric Project, FERC No. 2016, May,1999". The documents are in the offices of Tacoma Power next to Tacoma Water and probably at FERC offices as well. The documents deal with 4 dams on the Cowlitz. Sierra Club directs your attention to the Mayfield dam because it is almost as tall as the Howard Hanson dam. The study also mentions the Clackamas fish ladder in western Oregon as an "example of a long ladder that successfully passes adult migrants."

SHOULDN'T THE SERVICES "RIGOROUSLY EXPLORE AND OBJECTIVELY EXAMINE ALL REASONABLE ALTERNATIVES" FOR THIS HCP, AS REQUIRED FOR NEPA ? [40 CFR 1502.14(A).]

Tacoma's Proposed Green River HCP
Comments on Forests and Related Issues
Sierra Club, Cascade Chapter

March 31, 2000

Tacoma Water Department's Green River Habitat Conservation Plan provides a prime opportunity for the City to provide the best possible long-term protection of its lands, the water and the fish and wildlife dependent upon these resources. This opportunity will be missed if the City continues to rely on commercial logging of its forestlands in the upper Green River watershed. Ending logging and other improvements to the forest plan must accompany, not substitute for improved fish and flow provisions of the HCP, as addressed in other parts of these comments.

We object to a commercial logging program and the subsequent issuance of an incidental take permit by the US Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) for the six federally listed threatened and endangered species, one species proposed for listing, and 14 other unlisted species. The HCP fails to meet the requirements of the Endangered Species Act (ESA), 16 USC §§ 1531-1534, and for this reason alone, the permit request must be denied unless significant modifications occur.

The DEIS does not meet the requirements of the National Environmental Policy Act and its implementing regulations, 42 U.S.C. § 4331 et seq., 40 C.F.R. § 1500 et seq. The DEIS fails to adequately consider, evaluate, or document the direct, indirect, and cumulative effects of the destruction of terrestrial lands and evaluate or document how the considerable loss of habitat and lack of any mitigation measures will permit attainment of the objectives of the Endangered Species Act and other federal statutes and regulations.

51 The DEIS entirely fails to consider, evaluate, or document the environmental effects of fragmenting mature forests, isolating forest parcels, and eliminating critical wildlife habitat in the watershed. Impacts to species dependent on terrestrial environments are wholly impossible to determine as survey information is lacking or insufficient. The amount of "take" and effectiveness of measures to minimize and mitigate "take" are equally impossible to determine.

Our analysis indicates that the HCP fails to meet the requirements of the Endangered Species Act (ESA) and associated regulations. Consequently, we recommend the incidental take permit for City of Tacoma lands be denied unless the HCP and EIS are significantly modified or the no-commercial logging alternative is deemed the preferred alternative. Furthermore, as the HCP process relies heavily on the accurate application of scientific information, we recommend that future iterations of the HCP be reviewed and evaluated by an independent panel of academic and agency scientists, and by a citizen review board.

In summary, the following issues must be resolved:

Process and Documents

1) <u>Quantifiable data and resource objectives lacking</u>

According to ESA regulations and rules, the HCP must "include specific biological goals and objectives...." for measuring the effectiveness of conservation planning. In addition, biological objectives represent "...specific measurable targets for achieving the goals of the operating conservation program." (Draft Addendum to the Final Handbook for Habitat Conservation Planning and Incidental Take

Permitting Process." Federal Register, 64;45, March 9, 1999. Biological goals must correspond to full mitigation of impacts to the species, minimization and mitigation of impacts to the maximum extent practicable, and species' recovery needs, and other basic impact minimization and mitigation standards.

The Tacoma Water HCP fails to establish measurable biological goals for recovery, and for measuring "take" minimization and mitigation. Generally, the HCP's resource goals are extremely vague, unverifiable, and unenforceable. The HCP fails to consistently discuss how the HCP and ITP and their resulting habitat conditions, population levels, and other outcomes will relate to the biological goals and standards proposed in available scientific literature. The HCP also fails to provide adequate quantitative analyses or other analyses of how impacts to most of the covered species will affect survival and recovery.

Sierra Club et al v. Bruce Babbitt et al found that current data on species' conditions and recovery needs must be used; goals included in recovery plans are not sufficient if conditions have changed since those plans were written. Civil Action No. 97-0691-CB-C, Order August 4, 1998, S. Dist., AL, S. Div. The HCP and DEIS fail to meet these requirements. The HCP generally fails to identify species population levels and habitat conditions that would correspond to genuine recovery across the species' ranges, and fails provide concrete quantitative assessments of how the populations and habitat conditions stemming from the ITP and HCP will compare to these recovery standards.

Without quantifiable objectives, there are no substantive provisions that allow for monitoring effectiveness of prescriptions, and adjustments through adaptive management.

51 2) Proposed baseline is inappropriate

Tacoma Water proposes using current conditions as a baseline, yet much of the terrestrial wildlife habitat necessary for supporting listed and unlisted species is highly degraded from poor land use practices. Consequently, the HCP will not reduce the risk of extinction to many species, including those requiring snag habitat, small streams, intermittent streams, and other habitat for survival and recovery unless considerable restoration of wildlife habitat is conducted.

3) Best available scientific information not employed

NEPA and ESA section 7(a)(2) and the Act's administrative rules require agencies to use the best available science. The HCP does not apply or consider the best available scientific information.

The HCP employs arbitrary rationales for thinning as a method for "accelerating" old growth conditions, completely unsupported by any scientific evidence. Throughout the draft EIS/HCP, there is discussion of the benefits of specially designed treatments to accelerate the development of old-growth conditions. However, no context is provided along with these statements. For example, what are the specific criteria which will be used to determine whether a stand needs to be "ecologically thinned"? What evidence are these criteria based on?

Creating old-growth through thinning has yet to be done. Studies show that there is no evidence that the thinning of stands 30 years or older results in any net ecological benefits[1]. The concept that one can "accelerate" old-growth conditions by thinning remains largely an untested assumption. Therefore, it should not be the primary basis of an old-growth restoration strategy. Furthermore, for an activity whose long-term benefits are unclear, thinning is an expensive experiment.

[1] Carey, A.B. (1999, November) Biodiversity and Intentional Management: A Renaissance Pathway. Science Findings, PNW Research Station, issue 9, p. 3

4) Adaptive management provisions will not allow for needed changes in management

The Tacoma Water HCP fails to provide an adequate effectiveness monitoring program to provide for adaptive management changes. Given that the HCP is for 50 years, adaptive management provisions must be substantive and effective.

Sufficient vegetation and wildlife sampling must be conducted to establish monitoring trends and the presence and distribution of species across the landscape. As proposed, the HCP will only train Tacoma employees in the identification of covered species, in the event that a species is sighted, leaving the discovery of a covered species completely to chance. This method will provide no accurate data as to the presence or absence of a covered species over the life of the HCP, and render any meaningful adaptive management provisions useless.

The HCP's compliance and effectiveness monitoring must occur frequently over time, including monitoring of species' populations and reproduction, habitat quantity, habitat and specific habitat components, habitat trends, and other goals and indicators. The Tacoma Water HCP has failed to do this.

5) High Standard for ITP

ITPs and HCPs should only be used in limited circumstances. The ITP and HCP should not be used to eliminate or degrade habitats across significant portions of the landscapes, ecosystems, or species' remaining ranges. Likewise, ITPs and HCPs should not be used where more effective alternatives exist. The no-commercial logging alternative is clearly a more effective alternative to the proposed action.

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The Services must consider this alternative seriously, especially in light of the fact that City of Tacoma has provided no justification for commercial logging in their statement of purpose and need. Furthermore, no alternatives to revenue generation have been evaluated by the City. The ESA standard of minimizing impacts and providing mitigation to the maximum extent practicable has not been met.

It is essential to maintain late-successional forest habitat needed by several listed terrestrial species and to protect the upper Green River and its tributaries for fish habitat. The standard for an incidental take permit is far higher than for the state Forest Practices Act or Tacoma's current Forest Land Management Plan. Pursuing the goals of the Endangered Species Act, especially recovery, must be the driver in this HCP, not commercial logging.

6) No Surprises still a problem

A 50 year incidental take permit is too long given the no surprises policy. Either a shorter permit period or greater ability to modify the HCP to improve habitat conditions should be established. The current permit provides great amount of certainty to Tacoma, but great uncertainty to the public's fish and wildlife. This is not an equitable agreement, and must be changed.

Forest Management

1. Management Zones

Tacoma Water owns 10.1% of the land in the Upper Green River Watershed (14,888 acres), primarily along the banks of the Green River. Under the proposed HCP the existing Management Plan will be retained with few changes. The current forest management plan appropriately eliminated "maximizing" timber volume in the commercial zone. This HCP should eliminate the commercial logging altogether.

Thirty-nine percent of the area (the Natural Zone) will have the highest level of protection and no logging. Another 35% (the Conservation Zone) will sustain some amount of thinning of forests. The conservation zone is designed to develop into late-successional stage habitats. When this occurs the plan indicates logging will cease. While we certainly support the objective of ending the logging, again, we urge caution in manipulation of the vegetation to achieve the desired result. Only in areas recovering from recent clearcutting should be considered for thinning operations.

Twenty-six percent of the land (the Commercial Zone) will be used for "producing merchantable timber". The revenues created from these practices will be used in watershed land acquisition, forest management, fish and wildlife habitat and water quality enhancement projects. Such logging activities place a priority of commercial interests over water quality and habitat protection no matter how many environmental precautions are taken.

Any management activities in the protected zones should receive careful scrutiny plus public involvement for significant actions. Salvage logging is of particular concern.

2. Ecological Risks

While some public officials assert that commercial logging will not harm water quality or wildlife habitat, there is much evidence to the contrary. Forests act as giant air and water filters, and also act as reservoirs by increasing water yields in the crucial dry months and reducing flooding in wet months. Preserving those forests diminishes the need for Tacoma's turbidity pool and flood control storage volumes as well as the AWS (Additional Water Storage) project.

51 Logging can produce massive imbalances in the natural soil-forming and erosion cycles, increasing levels of sediment in our drinking water. Tacoma's lands, bordering the Green River, are some of the most vital for water and habitat protection, thereby increasing the need for preserving those forests.

3. Illogical Economics

Funding land acquisition and restoration efforts through commercial logging may establish an illogical economic model. Causing damage to repair damage does not make sense. The long-term costs of repairing ecological damage associated with logging far outweigh the short-term financial benefits (e.g., water filtration costs, landslides, road repair, etc.). Alternatives other than logging revenues, to fund the acquisition of lands in the watershed need to be explored. Timber markets are unpredictable, making logging revenues as a funding source a risky practice. We believe that when all of the above factors are considered (and they must be considered) it will be apparent that commercial logging doesn't economically benefit the community.

4. Forests & Wildlife

The Green River watershed has been heavily roaded and logged, with resulting impacts to the native forest ecosystem. Tacoma now manages important wildlife and fish habitat which includes significant late-successional forests. Full protection of these forests is the best assurance of maintaining high water quality and sustaining fish and wildlife populations. The Forest Service has stressed the importance of connectivity in late-successional forests through the checkerboard lands that include the Green River. While the current plan objectives attach greater importance to wildlife and fish habitat than earlier versions, it still fall short of that needed for the conservation and recovery of endangered species.

5. Wildlife Species

Many species will be adversely impacted by the proposed action. Those dependent on late-successional forests, including salamanders and other amphibians will be impacted the most. Acquisition and preservation of forests adjacent to the City's ownership could offset the impacts of the reservoir, logging,

roadbuilding and other impacts of Tacoma's operations. Rock Creek, Sawmill Creek and Eagle lake would be good choices. A few examples illustrate the flaws of the draft HCP.

Marbled Murrelets
Tacoma owns lands in Rock Creek near where marbled murrelet nesting was found last summer. However, Tacoma proposes to continue logging in that area (Commercial zone). The HCP must reverse the trend of loss of habitat, and require restoration of murrelet nesting habitat in this area. Merely promising not to destroy murrelet nesting habitat is not sufficient for a 50 year ITP. Further monitoring for murrelets in the old-growth grove in Sawmill Creek should also be done.

Spotted owls
The Services cannot become complacent about this species whose population continues to dwindle. Spotted owl critical habitat units and state SOSEAs have been established in the Green River Watershed, underscoring its significant role as nesting habitat and dispersal habitat for the Cascades population. It is acknowledged as a critical connectivity corridor between the north and south cascades for many species, including the spotted owl. Given the degraded state of the forests in this area, USFWS cannot grant ITPs to destroy additional habitat here.

Northern Goshawk
In reviewing the conservation strategies developed for listed species, we would like to raise concerns regarding the lack of information and studies on the northern goshawk. Northern goshawks are highly sensitive to human disturbance. Unbroken canopy of second-growth forests in the lower watershed provide important habitat for goshawks.

51 Given the lack of information, the goshawk's sensitivity to disturbance, and the importance of second-growth lowland habitat, we question whether the potential impacts of the proposed action to the goshawk have been understated. The main basis for the net improvement to goshawk habitat as stated in the draft HCP is the ecological and restoration thinning of second-growth forests and long-term regeneration of forest habitat. We again question the actual long-term benefits of thinning, given that the practice is still considered experimental. Thinning is not adequate enough to use as a primary conservation measure for goshawks. We also question the baseline used in making this assumption (see: Proposed baseline is inappropriate).

We encourage the Services to deem the no commercial logging alternative as the preferred alternative to reduce disturbance in the form of timber harvest and road usage. The no commercial logging alternative would have the greatest positive effect for the northern goshawk, however, nowhere in the EIS is this stated. The EIS must be thorough and accurate in representing the benefits of each alternative.

Pacific Fisher
According to the Washington Department of Fish and Wildlife Status Report on Fisher (September 1998), fishers use forests with a high percentage of canopy closure, abundant large woody debris, large snags and cavity trees, and understory vegetation. While fishers are associated with late-successional conifer forests, they also use younger stands, especially
as foraging habitat. Furthermore, the majority of fishers in western Washington tend to be found in areas less than 1800 m in elevation.

Since the majority of Tacoma Lands within the watershed are less than 1800m, they provide the best long-term opportunities for habitat recovery for the fisher. However, Tacoma's claim that fisher habitat will improve under the proposed action is questionable. The HCP states that it "will have positive effects on the Pacific fisher by reducing disturbance to denning fishers, increasing riparian protection, and

managing for late successional conditions; but overall the positive effect will be minor because few, if any, fishers are likely to occur in the HCP area."

Once again, Tacoma is claiming to create late-successional/old growth habitat through thinning with no scientific evidence that forests will be benefit from such treatments. Nowhere in the HCP does the Tacoma address the risks of thinning, such as windthrow. Thinning stands can expose them to wind, causing excessive windthrow and excessive opening of the canopy.
How could this affect fisher habitat? Tacoma also does not discuss how entering younger stands will affect fisher foraging habitat.

Lastly, how can Tacoma claim that if the fisher "does inhabit any portion of the HCP Area, it will occur only in small numbers in the upper watershed" without any reference to surveys conducted in the past or to be conducted in the future. Tacoma cannot rely on chance sightings as an accurate indicator of species distribution across the landscape. If Tacoma
is to adequately provide for the protection and, most importantly, the recovery of fisher in the Green River Watershed, Tacoma must actively monitor for species' populations and reproduction, habitat quantity, habitat and specific habitat components, habitat trends, and other goals and indicators. The proposed action alone is not sufficient to achieve recovery of the fisher in the watershed. We believe that the no-commercial logging alternative provides the best and most practicable option for fisher protection and recovery.

51 6. Unroaded Lands

The unroaded areas left in the watershed are extremely important. These ecological anchors are the largest blocks of intact forest, the most undisturbed streams and provide the greatest security habitat in the watershed. These include Kelly Butte (~14,000 acres) and two smaller areas (Friday Creek, McCain Creek) north of the Green River where the city owns land. Much of the former was protected by Congress when it established a Kelly Butte Special Management Area on the national forest lands in Lester, Sawmill and Rock creeks. This provides a core area for late-successional forest species conservation, but is not sufficient by itself. Plum Creek is aggressively logging its lands, adding to the importance of protecting forests on Tacoma lands.

While some of Tacoma's unroaded lands are allocated to the natural zone, we are still concerned with the proposed logging and roadbuilding in and adjacent to the Kelly Butte roadless areas. The lands remaining in the commercial zone between the Green River and Kelly Butte (sections 24, 19, 20) should be managed to restore a natural forest and eventually included in the natural zone. In the interim, designation of this area in the conservation zone would provide the flexibility to do the restoration work, with the clear objective of re-establishing late-successional forests in an unroaded condition. Additional areas in Champion Creek (section 28), Rock Creek and near Eagle Lake should be treated the same way. The unroaded lands along the Green River (sections 21, 27) should be designated to provide the maximum protection possible with the goal of acquisition of the timber rights as soon as possible.

7. Roads

Roads cause major problems for both fish and wildlife. No new roads should be allowed under the HCP. Even well designed and constructed roads will increase sedimentation and impact wildlife (see FEMAT report) by destroying and fragmenting habitat. The basin is so heavily roaded that it has caused incredible impact to both terrestrial and aquatic systems.

We strongly support the decommissioning of roads, especially in the area between the Kelly Butte Roadless Area and the Green River. A significant portion of the road mileage on Tacoma's lands is not needed for administration or access to other owners. These should be obliterated as soon as possible. Ten

years should be more than adequate. No additional road access to other ownerships should be granted by Tacoma across its lands.

8. Watershed Analysis

We are pleased that Tacoma will be participating in the watershed analyses scheduled for the basin. The federal watershed analysis has been completed and describes a seriously degraded watershed, with extremely high road densities and little late-successional forest. It is regrettable that the analyses prepared under state rules are limited to physical factors and direct impacts on fish. Cumulative effects are poorly addressed and the analyses do not consider terrestrial species or indirect effects at all. The City should insist that these other issues be addressed in these watershed analyses.

9. Riparian

Full protection of the riparian zones is critical to the success of the forest plan and HCP, the recovery of the salmon and other fish of the watershed and maintaining high quality water. While the proposed stream buffers (riparian management zones) were an improvement over the minimal state forest practices standards they are still far below that recommended by federal scientists (FEMAT report). Again, eliminating commercial logging will avoid these problems. There should be no further road building in any riparian zone, and an aggressive decommissioning of roads there commenced.

10. Timber Management

The current plan allows considerable commercial logging. The conservation zone still has a 100 year harvest cycle for the conservation zone, with annual harvest acreage of 80 acres. While contiguous even-aged (clearcut, shelterwood) units at 40 acres are below state standards, these practices should be eliminated entirely.

51 The deferral on logging the recently acquired federal lands in the natural zone should be permanent. We have also encouraged the City to acquire the timber rights held by Plum Creek along the Green River as soon as possible, especially in the Kelly Butte roadless area, to implement the Utility's conservation strategies.

Alternative B strategies go to great lengths to try to mitigate for the impacts of additional logging and road building. Most of these would be moot if the HCP just eliminated commercial logging on the City's lands in the watershed. For example, salvage logging for safety near roads would be unnecessary if the road no longer existed. Standards for restoration projects could be patterned on the Seattle's Cedar River Watershed HCP.

Proposal: Alternative C modified- No Commercial Logging, Reduced Roads

We propose that the USFWS and the City of Tacoma adopt a "no commercial logging" standard as reflected in Alternative C, with some modification. This alternative should be amended by a provision of no new roads, and specifying substantial road decommissioning. The list of mitigation measures for individual species, under Alternative C (Table 2-18b) appears to allow considerable development. This should be curtailed. Acquisition and preservation of additional forest lands should be required to mitigate for impacts of Tacoma's facilities and operations that have destroyed or degraded late-successional forest habitats for any species noted in the HCP.

The entire land base, other than under the power lines, should be allocated to the natural zone. In recently clearcut areas that are currently in the commercial zone, short term use of the conservation zone prescriptions might be used. These thinning operations in "plantations" should end within five years, and road obliteration commenced in those areas.

Even with the minimum standards established in the plan, the adaptive management approach will require a high degree of caution in order to adjust the forest management and mitigation to address unforeseen circumstances. Monitoring the early management activities is essential to determine if they are providing the benefits expected within the limits of environmental impacts allowed.

Public involvement should be actively solicited for any watershed activities, including restoration
51 projects. The HCP should establish an accountable process for citizens to become involved in decision-making for the watershed *before* plans are realized.

Tacoma can and should develop and implement creative funding alternatives that do not include such destructive activities as commercial logging. Many alternatives could be considered, for example:

- a minimal rate increase
- adjusting rate structures (e.g., adding additional higher priced tier for high summer use)
- a summer surcharge for commercial customers
- corporate donations

RECREATION AND AESTHETIC (VISUAL) RESOURCES

The Sierra Club is not only an environmental organization but also has a long tradition as a recreational organization. Enjoyment of the Outdoors -- the Natural Environment -- through hiking, boating, fishing, swimming, camping, mountain climbing and other activities leads many of Sierra Club's members to a commitment to protect the Natural Environment. Awareness of the importance of the Outdoors for renewal of the spirit permeates the programs of the Sierra Club.

52 The Green-Duwamish Watershed contains many beautiful places and many locales which are used for a variety of recreational activities in a Natural setting. Many of those places are close to the river, because the presence of flowing water enhances the beauty, tranquility, and spirituality felt by those who seek out such places for Recreation and renewal.

Both the Draft EIS and the DHCP recognize to some extent the beauty and recreational value of the watershed, the importance of it for recreational purposes to citizens of the region and the fact that some aspects of the HCP and of Tacoma's uses of it impinge on recreational and aesthetic enjoyment and use of the watershed.

UPPER GREEN RIVER WATERSHED

As noted in both the DHCP and the DEIS, the entire Upper Green River Watershed is for the most part closed to recreational use. This closure has been in effect for many years because Tacoma considers the presence of the public to be a threat to the water
53 quality of its municipal and industrial water supply. Logging operations, including their human component, have been allowed to continue relentlessly, however, on both public and privately owned lands. Recreation is banished from public lands owned by federal and state agencies as well as timber company lands and those of Tacoma, at Tacoma's request.

Sierra Club takes the position that there should be some access to parts of the Upper Watershed. There are areas far from the Green River and even farther from Tacoma's water diversion where people could access US Forest Service trails if Tacoma
54 would facilitate linkages to assist people in getting to those trails. As partial mitigation for the loss of recreational use of lands in the Upper Watershed which don't even belong to Tacoma, Sierra Club requests that Tacoma add to other mitigation efforts by adding such linkages, enabling additional recreational use in the Upper

Watershed.

MIDDLE GREEN RIVER WATERSHED

Recreation and Visual Resources in the Middle Green River Watershed are very important to the Region. State Park lands run along a large part of the Green River from Kanaskat-Palmer State Park to Flaming Geyser State Park. A number of trails run through the State Park lands. These lands are used by Hikers, Picnickers, Swimmers, Inner-tubers, Boaters, Wildlife and Bird Watching, Fishermen, and Campers.

Recreation and Visual Resources in the Middle Green River are impaired by the current large (113 cubic feet per second) withdrawal of water from the river for Tacoma's Municipal Water
55 Supply. They are further impaired by the operation of the US Army Corps of Engineers' Howard Hanson dam (3.5 miles above Tacoma's diversion dam. They will be further impaired by Tacoma's proposed Second Water Supply Project's withdrawal of an additional 100 cubic feet per second (cfs) and by Tacoma's plans (with the Corps of Engineers) to double the amount of water stored in the reservoir behind Howard Hanson dam for Municipal Water Supply. Such drastic changes to the hydrology of the river not only impair the fish and wildlife of the Green-Duwamish Watershed, but the people who need the Recreation and Aesthetics of the Watershed.

Probably most affected of the recreational users of the Watershed by such changes in the hydrology of the river are
56 the Fishermen who prize wild salmonids, for these species are in trouble and need their historic natural flow regimes. Also highly impacted are Canoeists, Kayakers, Rafters, and other boaters who can be found on all of the reaches of the river from their first access point below the Tacoma diversion dam to the mouth of the Duwamish River. And most affected
57 of these are the whitewater boaters -- Rafters, Kayakers, and Canoeists -- who love to run the Green River Gorge. This is the case because the Green River Gorge is sensitive to flow levels. The whitewater boaters require a substantial flow to make it safely over the rock ledges in the river bed and between the boulders scattered in the river.

At this point in the river's trip to Elliott Bay, it is a small river which has been made even smaller by the loss of a substantial
58 portion of its natural flow due to Tacoma's water diversion and

to operations of Howard Hanson dam including the time when the river is not flowing at its natural level because the Corps of Engineers is reducing the flow in order to fill the reservoir behind it with water saved for Tacoma's Water Supply in summer and fall when there is little rain.

58 Whitewater boaters need water in the river just as salmonids do. Taking more water out of the river for Tacoma's water supply is contra-indicated for both. Additional Water Storage for Tacoma's water supply also negatively impacts both. Sierra Club's position is that Tacoma should not be allowed to do either of these high impact activities under the aegis of an HCP which has only one purpose: protection and restoration of the species in the Watershed, including the salmonids Tacoma suggests should be covered by the HCP and the ITP.

If an HCP is ultimately agreed upon, it should include additional mitigation for recreation losses in the Middle Green, particularly losses for whitewater boating. Tacoma and the Corps of Engineers cannot predict what the reality is for Spring refill of the reservoir behind Howard Hanson dam. Doubling the amount of water storage means that flows will be less than what would naturally occur for a longer period of time. That means loss of "boater-days."

59 For the myriad of whitewater boaters who flock to the Green River Gorge whenever the river is running at a high enough level to provide a reasonably safe trip, there are gage levels which are decision points for them. Depending on their level of confidence on any given day and their expertise, boaters decide not to run the Green River when the flow is below (or above) a certain point. For most rafters, that gage point is when the river is running at less than 1300 cfs at Kanaskat-Palmer, or more than 4,000 cfs. For kayakers and canoeists, the range at which they prefer to run the river is 1,000 cfs to 3,000 cfs. Because different boaters have different decision points, it's not "All boaters are on the river if running at 1300 cfs, all boaters are off the river if running at 1150 cfs." The question is how many boaters are on the river when it is running at 1150 cfs and how many decided not to boat the Green River that day. How many boaters are on the river when it is running at 1250 cfs and how many decided not to boat the Green River? And so forth. So, the concept of "boater days" would provide data on how changes in flow affects how many boaters are on the river on any given day.

60 By doubling the storage of water behind the Howard Hanson Dam, whitewater boating opportunities could be gone much

earlier in the Spring, relegating the Green River's availability to boaters to not much more than the Winter months. The Green River Gorge is deep enough that in many places not much sunlight penetrates. Many whitewater boaters give up on the Green River Gorge in the Winter because it is too cold. Cold hands make it hard to paddle or row. Cold in general can lead to hypothermia. That condition with its impaired thinking and reduced body movements can impair boater safety. The impenetrability of the Gorge in many places makes aborting the trip and leaving the Gorge difficult if necessary.

60

The Green River also supports commercial rafting guide service businesses. With Tacoma's plans to divert an additional 100cfs of water from the Green River and to double the amount of water storage in the Howard Hanson reservoir, lower flows in the river will adversely affect this industry. Loss of commercial and non-commercial whitewater boating can have an economic impact on the small towns near the Green River Gorge.

61

Tacoma must mitigate for recreation impacts by being required to buy additional forest lands, with no logging subsequently allowed on them, to improve the hydrology and thereby the instream flows which would enhance the likelihood of recovery of salmonids and would help mitigate for impacts on recreation.

62

Tacoma must also mitigate for its impacts on Recreation by working with the Corps of Engineers to keep flows as high as possible throughout the year, with the possible exception of untoward events which would cause major flooding downstream where people have been allowed to foolishly build on the floodplain.

63

Additionally, Tacoma must, with other regional water suppliers, implement regional water rate reform. This would mean that block rates are adopted for all seasons. The first block of water would be low cost but the number of gallons received at the low rate would make consumers put in an effort to conserve water in order to avoid having to pay the higher rate at the next block level. There has to be a high enough rate at the second and subsequent blocks to give people an incentive to save water. The effect of implementation of such water rate reform over the Tri-county area (King, Pierce, and Snohomish Counties) would mean 30-40% more water would be available for instream flows and for municipal water supply.

64

LARGE WOOODY DEBRIS

Tacoma and the Corps of Engineers plan to add Large Woody Debris to the river to help create certain kinds of habitat for fish.

65

According to the Corps of Engineers, much of the LWD will be put into the Green River shortly below the Tacoma dam and allowed to flow down the Green River as it might if the dams were not obstructing its course from forested lands to some downstream permanent or temporary resting place. Other techniques have been tried by King County, such as ramming tree trunks into river banks with the root wads sticking out into the river. At times such arrangements are anchored with chains, etc. Typically, such installations have been used in bank stabilization programs, often where levees have been constructed along lower reaches of the river and are now slumping. Bank stabilization is most
65 often needed on outside bends in the river because the current slams into the bank on such bends. Unfortunately, an inadvertent swimmer, a child in an inner-tube, an inexperienced boater in trouble will also be swept into the bank on an outside bend. If Large Woody Debris is used there, people can get snagged on it and die. Large Woody Debris has a hard time staying put in such a location anyway, and often such a location is not the best one for placing Large Woody Debris to slow the water's flow and create a resting place for fish. Boaters have concerns about Large Woody Debris programs without input from boaters on specific installations.

Sierra Club agrees and requests that Tacoma and the Corps of Engineers establish such an Advisory Committee.

FINANCING THE HCP

66 Chapter 8 of the HCP states that Tacoma's cost for the HCMs are $15,461,000 (table 8-1). A closer look at the HCMs and removing items that are either State regulatory requirements or BMPs results in an estimate of less than $3,000,000 for the mitigation package. This estimate averaged over the 50 year period of the HCP results in a cost of less than $60,000 per year. This is especially unimpressive when considering the total 213 cfs that Tacoma wants to take from the river, the incidental take of endangered and threatened species, and resulting revenue which Tacoma hopes to secure over the same 50 year period.

Using only the information available in the HCP, the following categorical estimate was made:

67 Of the first category of HCMs (HCM1-01,02,03,04,05) which are designed to compensate for impacts resulting from Tacoma withdrawals, only the upstream fish passage and downstream bypass facilities at the Tacoma headworks dam (5.5 million dollars total) and a minor amount of wood placement (10K dollars) result in a cost to Tacoma. The primary mitigation tools of minimum instream flows and seasonal constrictions have no cost under normal conditions. The upstream and downstream fish facilities are a requirement per State Hydraulic Code: dams to be provided with an efficient fishway (RCW 75.20.060) and water diversions to be screened (RCW 75.20.040). These should not be considered conservation measures.

Estimate of Total Real Cost HCM 1: $10,000

68 The second category, HCM 2 is mitigation for non-Tacoma actions (i.e., gravel replacement for Howard Hanson Dam's supply interruption). It was surprising to see that two of the most important mitigations, the downstream passage at HHD and gravel nourishment, has no cost to Tacoma. The 300,000 dollar cost of juvenile salmonid transport and release is not considered a conservation measure as it is tied to the MIT agreement which is therefore hatchery fish dependent and probably detrimental to the recovery of wild salmonids. The two remaining measures that incur a Tacoma cost are low flow augmentation ($400,000) and wood debris management ($500,000).

Estimate of Total Real Cost HCM 2: $900,000

The HCM 3s are for non-water withdrawal impacts of the HCP (e.g., forestry operations).

69 Most of the 7 million dollars of cost Tacoma reports in this category are for the forest management practices including road maintenance. An undisclosed percentage of the cost is for lost revenue. Most of the measures appear to be a combination of current BMPs and forest regulations (e.g., no logging in riparian buffers which are already

protected by current forest regulations and Shoreline Act).

Estimate of Total Real Cost HCM 2: $2,000,000

69

Total $2,900,000

Annual Total 60,000

The remaining comments focus on financial opportunities that Tacoma Public Utilities (TPU) has to finance the protection and restoration elements of the HCP. These comments are based on financial statements of TPU's Water Division 1998 Annual Financial Report as well as information on watershed management (City of Tacoma's Green River Watershed Forest Land Management Plan July 1, 1996), timber revenues and costs provided in response to information requests. Tacoma should increase its system development charges to pay 100% of the costs of system developments. This will create rate equity whereby new ratepayers are paying for the costs to serve them and will allow funds to be spent on environmental protection and restoration in the Green River.

70

Tacoma should ensure that revenue collected for depreciation costs are used to either pay down debt or fund capital projects. Otherwise, future ratepayers will be saddled with a financial liability and/or debt burden and a system that requires major capital overhaul. To provide an additional incentive for water conservation, TPU should collect depreciation funding through a summer rate surcharge. All customer classes should pay a summer surcharge to fund conservation measures.

71

In general, Tacoma should pay for the HCP by increasing rates. It is the ratepayers of Tacoma who have not paid the real cost of water for almost a hundred years that must step up now and take care of the salmon and other species that have suffered for the failure of Tacoma to have ratepayers pay the true cost in the past. Tacoma should in no part, be paying for the costs of protection and recovery of salmon and other species by cutting trees and selling them. It is totally unacceptable to pay for the costs of Tacoma's impacts on Salmonids and other species and for restoration efforts for those species by cutting down trees which contribute to the recovery and protection of them. Rather than logging trees on Tacoma's lands, Tacoma Public Utilities should be spending money to buy other parcels of land in the Upper Watershed to increase the City's percentage of ownership of the Upper Watershed and the number of trees protected from logging.

72

Tacoma must work with other regional water suppliers to implement regional water rate reform. This would mean that block rates are adopted for all seasons. The first block of water would be low cost but the number of gallons received at the low rate would make consumers put in an effort to conserve water in order to avoid having to pay the higher rate at the next block level. There has to be a high enough rate at the second and subsequent blocks to give people an incentive to save water. The effect of implementation of such water rate reform over the Tri-county area (King, Pierce, and

73

73 Snohomish Counties) would mean 30-40% more water would be available for instream flows and for municipal water supply. A surcharge should be added for Summer and Fall when supply is low and Demand is high, of course.

CONCLUDING REMARKS
HABITAT CONSERVATION MEASURES (HCM)

The following is a synopsis of some of the more important points regarding the HCMs.

HCM 1-01 North Fork Well Field

74 The North Fork Green River is the largest tributary to the Green River in the upper watershed and the wells can dewater the system from river mile 1.5 to 0.0. The stream is currently used by resident species and some outplanted salmon. The North Fork is expected to be one of the most important tributaries in the upper watershed for salmon recovery. This is a serious threat to existing salmonids and potential recovery efforts. The wells are

75 "used approximately 11 days per month between November and May" (page 7-35, line 2,3) and an undisclosed amount of time outside of that monthly range. Salmon of certain species or life stage will be present in the river at all

76 times of the year. There is not enough information disclosed within the HCP regarding North Fork Green River flows and their response to pumping to justify incidental take coverage for 50 years within the HCP.

77 The measure (HCM1-01) is obviously a last minute attempt to gain coverage for a poorly conceived conservation measure. This attempt to mitigate a severe impact did not even merit it's own HCM but was "tacked-on" to a previously written measure dealing with minimum instream flows to the Green River. The measure is only a study to identify the maximum rate of pumping

78 that will maintains a stage reduction of no more than one inch per hour. This rate is still capable of stranding salmon, stopping migration, desiccating eggs and completely dewatering eggs.

Solutions:

79 Commitment to use Tacoma's other groundwater supply before the NF wells should be a measure that could be initiated immediately but would not be enough on its own. The wells may still be needed although less frequently.

80 Alternative analysis that could produce a method that doesn't impact surface flows, e.g., new ground water source.

81 The ultimate solution is turbidity filtration of Tacoma's water supply, therefore making the wells obsolete. Tacoma mentioned that this may be a future requirement, therefore the only additional cost would be to expedite the filtration system.

82 Treatment at the source: If most turbidity is due to forest practice activities, Tacoma should be considering a long term comprehensive acquisition program for the upper basin. The forest land could then be

82 preserved for multiple resource restoration objectives besides curtailing turbidity.

HCM 2-01 Howard Hansen Dam (HHD) Downstream Fish Passage Facility

A measure to provide safe, efficient downstream juvenile fish passage through HHD may be the single most important project for the recovery of salmon on the Green River. Although HCM 2-01 attempts to address the passage issue the device needed at this dam will be experimental and is not yet considered a proven method. In addition, the device is estimated to result in a 36% mortality rate for chinook. An instantaneous mortality rate this high will seriously reduce the likelyhood of success for any recovery effort in the upperwatershed. The standard for survival needs to be raised
83 significantly and the current estimate should not be considered adequate, especially over the 50 year duration of the plan as technology advances.

Solution

If it is a matter of cost to increase efficiency, it should be spent. If today's state of the art engineering resulted in this amount of impact, the job should not be considered complete. Tacoma and the ACE should be tied to substantial financial commitment to research and development for an improved passage device until mortality can be lower to acceptable levels.

HCM 2-05 Juvenile Salmonid Transport and Release

This conservation measure describes the Tacoma funding for a MIT hatchery and provides the transportation for the hatchery juveniles to the upper watershed. Even though Tacoma downplays its association with the hatchery by claiming it will be permitted under a different process it does intend to move transport the hatchery fish to the upstream of HHD. These two activities could be in direct conflict with the Services HCP criteria for
84 ITP issuance- "the taking will not appreciably reduce the likelyhood of survival and recovery of the species in the wild". King County sees the upperwatershed as one key to wild salmon recovery in the Green river and the perpetuation of a hatchery stock could impact recovery in the wild by:

* Reduce salmon genetic integrity

* Alter behavior of salmon

* Increase harvest pressure on depleted wild populations

* Displace wild salmon

84 * Eliminate nutritive carcass contribution

Solution:

Eliminate HCM or any other Tacoma action that could initiate hatchery management of the upper watershed, use funds to truck salmon adults upstream of HHD.

Wildlife Conservation Measures (All)

There are significant information gaps in the HCP assessment of impact on wildlife and it is reflected by the inadequate conservation measures. This is especially true when compared with the amount of attention the HCP focuses on fish.

85

Solution: due to the inadequate assessment and long period of take requested, wildlife should be given all the attention it needs before release of the next Draft of the HCP. If it's deemed necessary, the Wildlife aspects could be separated from the HCP and dealt with in another permitting effort.

CUMULATIVE EFFECTS

86 The DEIS does not meet the requirements of the National Environmental Policy Act and its implementing regulations, 42 U.S.C. sec. 4331 et seq., 40 C.F.R. sec. 1500 et seq. The DEIS fails to adequately consider, evaluate, or document the direct, indirect, and cumulative effects of the destruction of the ecosystem throughout the Green-Duwamish Watershed for ESA listed and non-listed fish stocks. The DEIS fails to evaluate or

87 document how the considerable loss of habitat throughout the entire Watershed and lack of adequate-for-restoration-listed-species-mitigation and in-kind mitigation measures will permit attainment of the objectives of the Endangered Species Act and other federal statutes and regulations.

Cumulative Effects of Ecosystem destruction must be addressed by looking at the entire Green-Duwamish Watershed. Ecosystem destruction in the Watershed has been accomplished by many different human practices in the various sub-basins, including

88 inappropriate forest practices, agricultural practices, and development/land use practices; pollution of land, waters, and air by industrial uses; etc. The ecosystem destruction includes wetland losses; building in riparian zones and flood planes; dikes, revetments, and bulkheads; unconnected culverts under roadways, the two dams, and other fish passage obstructions; dredging and filling; many types of water quality impairments from

88 many sources; groundwater withdrawals; ever-increasing amounts of impervious surfaces; several fish hatcheries; fish harvesting practices; availability of habitat restoration sites and opportunities; etc.

89 The direct, indirect, and cumulative effects of all of this must be considered before the Services could consider allowing Tacoma to further degrade the watershed for ESA-listed fish species by such aspects of their Watershed plans (including this HCP), as current and future water withdrawals, additional water storage for municipal water supply purposes, helping build a Muckleshoot fish hatchery.

Such an analysis has not been done. Sierra Club's review indicates that the HCP fails to meet the requirements of the Endangered Species Act (ESA) (and other federal laws) and associated regulations, in part because of this failure to do an assessment of direct, indirect, and cumulative impacts.

90 Tacoma, Seattle, and the Army Corps of Engineers, along with the Services should now get down to business and jointly work on an environmental impact statement which includes the cumulative effects of the Howard Hanson Dam modifications, Tacoma HCP, Seattle-Tacoma Intertie, and the Second Supply Project. These projects are inextricably interlinked, and should be analyzed together for cumulative effects.

U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
MAY 30 2000
LACEY, WA
RECEIVED

THE MOUNTAINEERS
Founded in 1906 to Explore, Study, Preserve, and Enjoy the Natural Beauty of the Outdoors

April 19, 2000

Tim Romanski
U.S. Fish and Wildlife Service
510 Desmond Dr. SE #102
Lacey, WA 98503

Re: Draft Tacoma Water Habitat Conservation Plan for Green River Watershed

Dear Mr. Romanski:

1 The Mountaineers is the oldest and one of the largest conservation and recreation organizations in the Northwest, with about 15,000 members. We have been interested in water issues for many years, particularly as they relate to fish, wildlife, and recreation issues. We appreciate the opportunity to comment on this proposal.

2 The Mountaineers club does not support logging within the Green River watershed lands owned by Tacoma Public Utilities (TPU). In managing the upper watershed, our club supports Alternative 9.3.2. Although TPU only owns approximately 10% of the Green River watershed, these lands are directly situated
3 in the riparian zone of the river. Logging within this zone will directly affect the water quality of the river adversely impacting salmonid species this HCP is trying to protect. The area above the Howard Hanson Dam (HHD) has been extensively hydromodified by road and railway construction with in the flood plain; many
4 miles of stream habitat are blocked by culverts; miles of salmon bearing streams have been obliterated by debris flows attributed to forest management actions; and forests have been logged to the stream edge. TPU plans to use funds received
5 from logging operations to purchase more land within the watershed and pay for many of the HCP activities. During the TPU-sponsored community meeting held
6 in Tacoma on February 29, 2000, citizens expressed willingness to accept increased water rates to offset the need for logging. We encourage TPU to search
7 for alternative funding for land acquisition, such as the Water Quality Fund. We encourage TPU to begin a no-logging education program for their ratepayers,
8 explaining the positive effects of a program of this type for the ecological health of the watershed.

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9 The science surrounding river ecosystems and flow regimes has changed greatly over the past 20 years. This is a relatively new area of study and one that is constantly in the process of learning. The methods used to set base flows, such as in this HCP, are already being criticized by scientists as not being reliable to protect fish and fish habitat. TPU should not be allowed to set a strict flow regime for the next 50 years for a river as important as the Green River, based on a rapidly evolving scientific understanding.

10 The Mountaineers club supports instream flows that will mimic the natural flow of the historic Green River as much as possible. Overall, 70 percent of the flows
11 of its former watershed have been diverted out of the Green River Basin. While minimum flows set by this HCP and by the Muckleshoot-Tacoma agreement may help to meet important base flow needs, these flows fail to meet the standards necessary to conserve and restore fish. Recent science tells us that the current methodology used is not adequate to set flows that protect the entire river ecosystem - the riparian and flood plain areas as well as instream ecosystem
12 processes. What is needed is the integration of flow regimes that encompasses the cumulative impacts of these processes. By setting instream flows, Tacoma is only concentrating on the instream needs of fish. As mentioned, the entire river ecosystem needs to be addressed.

13 The Mountaineers club has a large contingency of recreational boaters and we do not feel the flows described in the HCP are adequate for either decked canoes or
14 kayaks. The middle reach of the Green River, known as the Green River Gorge, is a world class reach for boaters. It is important that this area run as naturally as possible and that the flows mimic the natural river flow. The rocky nature of the Gorge requires a minimum1200 cfs for a classic boating experience and to keep rocks covered for safety. It is understood that because of flooding dangers during certain times of the year the high flow would need to be curtailed, but we feel the
15 recreational experience should be mitigated for in this HCP. Because of fears of water contamination above the dam, boating is not allowed. Tacoma should mitigate for this lack of recreational opportunity and manage the flow of the lower Green River accordingly. The Green River also supports a commercial rafting economy. Lower flows in the river will adversely affect this industry. By doubling the storage of water behind the Howard Hanson Dam, boating and rafting opportunities could be lost two to three months earlier, in February or March.

16 The boating experience could also be adversely impacted by the method in which the Large Woody Debris (LWD) will be introduced into the river ecosystem. According to the Corps of Engineers, much of the LWD will be left to flow down the Green River below the Headworks, coming to rest where they may, without being anchored in strategic areas. Water hydrology dictates that much of the LWD will congregate in areas that will also be natural flow areas for boaters.

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17 This could create a very dangerous situation. We suggest the LWD be anchored in inward curves of the river in order to be safer for boaters and provide still pools for fish.

18 The Mountaineers does not support doubling the water storage behind the Howard Hanson Dam for several reasons. First, the larger inundation pool will flood existing elk habitat, necessitating the removal of the elk to another, artificially created, plain. This area will be created by logging existing forest and creating this new habitat. Not only does our club object to logging as indicated earlier in this letter, but we do not feel the elk can be moved without casualties. Just recently the unsuccessful attempt at moving elk on the Hanford Reservation resulted in 15 dead animals.

19 Second, because of the severe water level fluctuation of this larger pool, TPU is proposing planting several exotic plant species in the upper banks of the pool. TPU indicated that exotic plants are needed for planting because few native species can survive under water for a sustained period of time and then thrive once water levels recede enough to expose them. Species to be artificially introduced include sedges (Carex), Oregon Ash, willows, and Bald Cypress. We have strong objections to the introduction of the Bald Cypress. This species is far removed from anything native to the Pacific Northwest.

20 After reviewing all of these considerations, it is our recommendation that TPU manage the Tacoma lands in the Upper Green River Watershed with the No Timber Harvesting Alternative (9.3.2), increase flows in the river to mimic natural flows, and discontinue consideration of the Additional Water Storage Project.

Thank you for considering these comments.

Sincerely,
THE MOUNTAINEERS

Edward M. Henderson, Jr.
President

Roger Ternes
Branch Chairman, Tacoma

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4.2 NON-GOVERNMENTAL ORGANIZATION COMMENT LETTERS

Comment Responses to Green Duwamish Watershed Alliance (NGO 1) and Friends of the Green River (NGO 2)

NGO 1-1 and NGO 2-1

See General Comment Responses 3 and 23.

NGO 1-2 and NGO 2-2

See General Comment Response 7. The commenter is correct in implying that forests influence water quality and stream function in a number of ways. As suggested in the comment, forest vegetation can: 1) stabilize soil and filter surface flows to reduce the amount of fine sediment entering streams; 2) moderate the effects of storm events on stream flows; 3) provide shade that can reduce peak surface water temperatures; and 4) provide physical habitat (large woody debris) for fish and wildlife (see HCP subsection 5.3.2). All of these functions were considered in the development of the HCP, and all are accounted for in the riparian and upland management measures identified in Chapter 5 of the HCP.

Streambank integrity, vegetative filtering of surface flows, shade, and large woody debris would be provided by maintaining no-harvest forest buffers along all streams on the Covered Lands. Buffers will range from 25 feet wide on intermittent non-fish-bearing streams (DNR Type 5) to 200 feet wide on large fish-bearing streams (DNR Types 1 and 2). Streams within the Natural Zone would have even wider buffers. These buffers would meet or exceed the buffers prescribed by the recent Washington Forests and Fish Report, which represents the state of the art in commercial forestland management for fish and water quality.

NGO 1-3 and NGO 2-3

See General Comment Response 8.

NGO 1-4 and NGO 2-4

The Services and Tacoma Water agree that a flow regime that better mimics the natural flow regime of the Green River is desirable (see General Comment Response 27). Because it represents a small

fraction of the highest flows in the Green River (less than 2%), Tacoma's withdrawal will not appreciably affect high flows in the Green River. Furthermore, because high flows generally also represent high turbidity events, Tacoma generally reduces or stops water withdrawal from the mainstem Green River during high flow events.

The primary factor influencing the flow regime in the Green River is operation of Howard Hanson Dam, which is the sole responsibility of the USACE, not Tacoma Water. As noted in General Comment Response 16, the primary vehicle for coordination and flow management adaptation in the future will be the Green River Flow Management Committee. Conservation measures and monitoring to be implemented by Tacoma Water under its HCP would facilitate development of a more natural flow regime if that is the target condition identified by the Green River Flow Management Committee.

NGO 1- 5 and NGO 2-5

See General Comment Response 17. Although Tacoma Water withdraws a substantial portion of the Green River flow during the summer, the minimum flow requirements to be implemented by Tacoma under its HCP would meet or exceed existing instream flow requirements set by Ecology (HCP subsections 5.1.1 and 5.1.2). During extreme, summer low-flow events, conservation measures in the HCP will increase the amount of water in the river compared to baseline conditions. However, Tacoma Water has limited ability to affect water temperature and pollutant concentrations in the middle and lower watershed.

NGO 1-6 and NGO 2-6

See General Comment Response 13.

NGO 1-7 and NGO 2-7

See General Comment Response 22.

NGO 1-8 and NGO 2-8

See General Comment Response 20. The purpose of an HCP is to minimize and mitigate the impacts of any incidental taking authorized by a Section 10 permit, and to ensure that issuance of the permit does not appreciably reduce the likelihood of the survival and recovery of the species in the wild. An HCP is not required to recover listed species or restore habitat damaged by past actions, although

many HCPs, including Tacoma Water's, include measures specifically designed to rehabilitate habitat that is not currently considered to be functioning properly.

Interruption of gravel transport in the mainstem Green River has been primarily the result of construction and operation of Howard Hanson Dam by the USACE. Construction of the Tacoma Headworks in 1912 intercepted approximately 13,500 cubic yards of gravel, equivalent to less than 1 year's supply of bedload (U.S. Army Corps of Engineers 1998; Perkins 2000). In contrast, Howard Hanson Dam has intercepted virtually all of the bedload from the upper watershed for the past 37 years.

Moreover, Tacoma's proposed increase in the height of the Tacoma Headworks would not substantially influence the downstream transport of sediment. Raising the Headworks by 6.5 feet will result in approximately 43,000 cubic yards of increased sediment storage. Assuming that approximately 15 percent of the natural sediment load was bedload (Olympic National Park 1996), the structure would intercept approximately 6,500 cubic yards of gravel. The presence of Howard Hanson Dam upstream of the Tacoma Headworks currently prevents the downstream transport of gravel and larger-sized sediment. Consequently, the actual composition of intercepted materials is expected to be primarily fine sediments.

The volume of gravel-sized sediments that Tacoma Water proposes to add to the river would exceed the amount of material that would be intercepted by the raised Headworks. In addition, the increment of gravel placed by Tacoma under the HCP would be supplemented by gravel placed by the USACE as part of the Section 7 consultation process and jointly by the USACE and King County as part of the Green-Duwamish General Investigation Project. Together, these projects are expected to restore downstream movement of gravel.

NGO 1- 9 and NGO 2-9

See General Comment Response 18.

NGO 1-10 and NGO 2-10

See General Comment Response 4. Water conservation and reuse planning are integral components of Tacoma Water's efforts to protect and restore Green River aquatic resources. These methods alone are not sufficient to restore Green River instream resources, and therefore must be supplemented by other resource planning approaches.

NGO 1-11 and NGO 2-11

See General Comment Response 21.

NGO 1-12 and NGO 2-12

The comment letter written by the Sierra Club, Cascade Chapter, has been included as a part of the public record for this DEIS, and comment responses were prepared for the FEIS (see letter NGO 10).

Comment Responses to South King County Chapter Washington Council Trout Unlimited (NGO 3)

NGO 3-1
Comment noted.

NGO 3-2
Comment noted.

NGO 3-3
The USACE currently collects and removes drift (naturally occurring logs and other woody vegetation) from several water control projects in the Pacific Northwest, including Howard Hanson Dam on the Green River. These operations are coming under increased scrutiny due to concerns regarding the effect of these operations on downstream biological resources and the cost and environmental impact of drift disposal (typically by burning).

The issue of handling drift is not isolated to the Pacific Northwest. For instance, the USACE, Huntington, West Virginia, is currently modifying Bluestone Dam to minimize the need to handle up to 50 acres of drift that accumulates at the dam during storm events. Bluestone Dam is located on the New River in West Virginia immediately upstream of a reach designated as a National Scenic River and managed by the National Park Service. Although the New River below Bluestone Dam supports significant whitewater rafting and represents a regional tourist attraction, Bluestone Dam is being modified to allow organic material to be passed downstream during storm events to support downstream biological resources (Halstead and Werth 2000).

An important feature of the proposed Green River Woody Debris Management Program, HCM 2-08 is the commitment to monitor the results of the program and make adjustments as necessary to ensure that the program contributes to the recovery of natural stream processes in view of public health, safety, and flood control concerns.

NGO 3-4
See General Comment Response 18 for a discussion of the objectives of HCM 2-08, Downstream Woody Debris Management Program.

NGO 3-5 through 3-9

See General Comment Response 19 for a discussion of the Woody Debris Management Program and recreational use of the Green River.

Comment Responses to Rainier Audubon Society (NGO 4)

NGO 4-1

HCPs by definition cannot appreciably reduce the likelihood of survival or recovery of species in the wild. In other terms, an HCP cannot contribute to the extinction of any species whether they were or were not considered during the development of the HCP. The Services believe that it will be rare for unforeseen circumstances to result in a jeopardy situation. However, if such an event would occur with respect to Tacoma Water's HCP, the Services will use all of their authorities and resources, will work with other federal agencies to rectify the situation, and will work with Tacoma Water to redirect conservation and mitigation measures to remove the jeopardizing effects. The Services have significant resources and authorities that can be utilized to provide additional protection for threatened and endangered species that are the subject of a given HCP, including land acquisition or exchange, habitat restoration or enhancement, translocation, and other management techniques. In the event that the species continues to decline in light of these preventative measures, the Services retain the right to revoke Tacoma Water's permit in the face of jeopardy.

Discussions between the City of Tacoma and the Services during the development of the HCP were conducted with the knowledge and understanding that issuance criteria (see General Comment Response 3) must ultimately be met before an ITP is issued by the Services. However, the actual determination as to whether Tacoma Water's proposed HCP and ITP have met the issuance criteria will be made after the FEIS and Final HCP have been revised based on public input during the original 78-day comment period, and subsequently released for a second 30-day public review period. If at that time issuance criteria are met, the determination to issue a permit will be documented in the Services' decision documents consisting of the ESA Section 10 findings, ESA Section 7 biological opinions, and a NEPA record of decision.

NGO 4-2

See Specific Comment Response NGO 5-5 and General Comment Responses 11 and 12.

NGO 4-3

See General Comment Response 5.

NGO 4-4

The Services cannot compel Tacoma Water, nor did they compel the City of Seattle, to discontinue logging operations on their lands. It both instances it is the responsibility of the Services to ensure that activities proposed by either Applicant as covered activities under an HCP meet the issuance criteria of Section 10(a)(2)(B) of the ESA. These criteria are listed in General Comment Response 3.

NGO 4-5

See Specific Comment Responses NGO 5-3 and NGO 5-6. There are two different types of HCP recognized by the Services: outcome-based, where the Services and Applicant agree to a set of biological outcomes as the commitments of the permit holder; and prescription-based HCPs, where the Services and Applicant negotiate specific measures, for example the size, number and spacing of live recruitment trees, that are designed to produce habitat attributes or species responses. In the outcome-based HCPs, the Services believe quantifiable goals and objectives must be clearly articulated, or we have no recourse for determining non-compliance during permit implementation. However, with prescription-based HCPs, such as the Tacoma Water HCP, the importance of numeric goals and objectives is reduced, since the legal commitments made by the Applicant are the prescriptions and not the outcome of the prescriptions.

NGO 4-6

See Specific Comment Response NGO 5-7. The comment is incorrect in stating the measure addressing trees in the danger zone are vague. Habitat Conservation Measure 3-01F clearly states, "Danger trees felled in the Natural Zone *will* be left as wildlife habitat, or removed to be used elsewhere to meet one or more of the Conservation Measures of this HCP" (emphasis added).

NGO 4-7

See Specific Comment Responses NGO 5-7 and NGO 5-8. The conditions under which danger tree removal could occur in the Natural Zone are clearly stated in HCM 3-01F.

NGO 4-8

See Specific Comment Responses NGO 5-10, NGO 5-11, NGO 5-12, and NGO 5-15.

NGO 4-9

It is true that the overriding purpose of the ESA is to conserve the ecosystems upon which threatened and endangered species depend. With this in mind, when Congress amended Section 10 of ESA it was its intention that the HCP process and the issuance of ITPs would be used to reduce conflicts between listed species, ecosystem conservation, and economic development. To accomplish this the HCP process allows some individuals of a species to be harmed or taken under an ITP if such take is incidental to otherwise lawful activities, and if such take does not appreciably reduce the chances of survival and recovery of listed species in the wild.

Therefore, although Section 10(a)(2)(B) of the ESA does allow for the take of individuals of listed species and states that HCPs are not required to recover listed species, the Services do recognize that HCPs must be consistent with any federal recovery plans for listed species, and thus must allow for recovery of listed species to occur. In general, the Services believe that HCPs can provide an effective regulatory and management tool for the conservation of listed and unlisted species on non-federal lands.

NGO 4-10

See General Comment Response 4.

NGO 4-11

Tacoma Water has indicated to the Services that it regularly educates its residential and all other ratepayers about the benefits of state-of-the-art water-efficient landscape techniques. Techniques currently supported are numerous and include:

- Seasonal newspaper articles.
- Utility bill inserts.
- Distribution of rain gauges, rain sensors and water-efficient landscape literature at various public venues, such as the Puyallup Fair, and via telephone requests.
- First-hand expert advice to callers interested in water-efficient landscaping.

- In-kind support of the Metropolitan Parks annual Fall Native Plant Sale (Tacoma Water staff has for the last 3 years enhanced the sale catalog, with an expanded selection of native plants, plus plant descriptions that include size and habitat requirements that promote customer education in selecting the right plant for the right place).

- Support and/or facilitation of seminars and other professional programs that target the public, the landscape industry and conservation peers in Idaho, Oregon, and Washington (Tacoma Water staff includes a landscape horticulture expert).

- Periodic irrigation system audits of public agency landscapes.

- Participation in the Water Conservation Coalition of Puget Sound, an organization of utility conservation professionals whose mission is "to promote efficient water use in the Puget Sound region emphasizing water's true value as a natural resource and encouraging conservation." This organization has been involved with Seattle Public Utilities TV and radio campaigns, plus annual education efforts at the annual Northwest Flower & Garden Show.

- Participation with King and Snohomish Counties *Soils for Salmon* programs.

- Education of Washington State University Master Gardeners at annual training sessions and other events such as the American Red Cross Gardens of Tacoma landscape tour.

- Supporting and pursuing scientific research regarding the range of water saved by particular landscape practices such as the incorporation of organic matter.

- Annual provision of free and/or at-cost literature and water-saving devices to wholesale customers, including rain sensors.

- Provision of technical expertise in creation and review of literature and guidelines distributed by the Washington State Department of Health, Ecology and the EPA, as well as utilities and organizations throughout the nation.

Tacoma Water encourages its ratepayers to water their lawns and landscapes efficiently rather than requesting them to forego watering during the summer. Advocating a different approach to lawn care is not in the purview of Tacoma Water, which seeks to let customers choose how they manage and maintain their landscapes.

It should be noted that the conservation efforts listed herein (among others too numerous to list) cannot be promoted effectively by utilities alone. This is because there are numerous institutional and technical impediments that minimize or prevent participation or adoption of water-conserving habits. For example, efforts to update the city and county landscape codes to include soil preparation, minimum standard irrigation equipment, and appropriate plants as designed and/or reviewed by qualified professionals, have been rejected by various entities within the building and landscape communities.

The City of Tacoma has a grass recycling program that is operated by the recycling section of its Solid Waste Utility.

NGO 4-12

See General Comment Response 29.

Comment Responses to National Audubon Society, Washington Chapter (NGO 5)

NGO 5-1

Discussions with the City of Tacoma and the Services during the development of the HCP were conducted with the knowledge and understanding that issuance criteria (see General Comment Response 3) must ultimately be met before an ITP is issued by the Services. However, the actual determination as to whether Tacoma's proposed HCP and ITP has met the issuance criteria will be made after the FEIS and Final HCP have been revised based on public input during the original 78-day comment period, and subsequently released for a second 30-day public review period. If at that time issuance criteria are met, the determination to issue a permit will be documented in the Services' decision documents consisting of the ESA Section 10 findings, ESA Section 7 biological opinions, and a NEPA record of decision. Prior to this, it is premature for the Services to conclude that that Tacoma Water's HCP does not meet the requirements of Section 10 of the ESA.

NG0 5-2

Comment noted.

NGO 5-3

The biological goals and objectives of an HCP are the desired outcome of the HCP's conservation measures. Although not explicitly stated in Tacoma Water's HCP, as will be required in all future HCPs under the new "5 Point Policy" (65 FR 35242), the Services believe that the Tacoma Water HCP has incorporated biological goals and objectives in the habitat conservation measures of its HCP. For additional information on the biological goals and objectives of the HCP, see Specific Comment Response NGO 5-6.

NGO 5-4

The "5 Point Policy" requires the use of adaptive management in an HCP if significant biological uncertainty exist for Covered Species. Where Tacoma Water and the Services have identified significant biological uncertainty, it was addressed through the application of adaptive management. Specifically, subsections 6.2 and 6.3 of the HCP address where and when adaptive management would be used to respond to new information or changing conditions. Chapter 6 of the HCP also includes subsections on compliance monitoring to ensure HCP conservation measures are being implemented as agreed under the HCP and IA.

NGO 5-5

The cessation of timber harvesting on Tacoma Water lands in the Upper Green River Watershed is not a reasonable alternative under Section 10 of the ESA. While the primary purpose for owning the lands is to protect water quality, the City of Tacoma has determined that it will also manage the lands for commercial timber production where such management is not in conflict with the maintenance of water quality. This is an option that is fully within Tacoma Water's rights as a landowner. If Tacoma Water chose not to conduct commercial timber harvesting on its lands, the risk of incidental take of listed species on those lands would be negligible, and the need for ITP coverage would no longer exist. The Services do not consider the complete avoidance of covered activities (and therefore elimination of the need for the ITP coverage) to be a practical form of mitigation for an ITP.

The Services do not anticipate that the level of incidental take proposed for authorization under Tacoma Water's ITP would result in "severe risks to the viability of permitted species," as suggested by the commenter. Tacoma Water has requested ITP coverage for impacts to listed and unlisted fish and wildlife in the upper watershed that might result from commercial timber harvesting and other forest management activities. Most of the Covered Species are uncommon on the Covered Lands, and the level of timber harvesting proposed would be relatively low when compared to Tacoma's total ownership.

For a discussion of the pertinence of the Seattle Public Utilities' HCP to the Tacoma Water HCP, see General Comment Response 3.

NGO 5-6

This comment incorrectly characterizes the Tacoma Water HCP. The HCP follows the general conservation approach established in the federal Northwest Forest Plan, and it includes a number of very specific and quantifiable objectives for the maintenance of wildlife habitat. Habitat Conservation Measure 3-01B requires that 39.3 percent of the Covered Lands (5,580 acres) be managed to protect existing late-seral coniferous forest habitat and allow additional habitat to develop naturally. Habitat Conservation Measure 3-01C requires than an additional 34.8 percent of the Covered Lands (5,180 acres) be managed to promote the development of late-seral coniferous forest habitat, and to protect that habitat once it develops. Habitat Conservation Measure 3-01D requires that the remaining 25.9 percent of the Covered Lands (3,858 acres) be managed on long harvest rotations (at least 70 years), and that the annual rate of harvest be held to no more than 1.5

percent of the total area (approximately 60 acres). Habitat Conservation Measure 3-01G requires the retention of specific numbers of live trees, snags and logs, and the creation of snags where they do not already exist. When combined with the monitoring and evaluation measure EEM-01, HCM 3-01G provides very specific and quantifiable objectives for snag and log habitat over the long term. Lastly HCMs 3-02A and 3-02B provide specific and quantifiable objectives for the retention of riparian forest habitat on the Covered Lands and the protection of aquatic habitat.

All HCMs and EMMs are provided in HCP Chapters 5 and 6. In both chapters, the specific measures are highlighted in text boxes to minimize confusion over the commitments during implementation and monitoring. The text following the highlighted and boxed commitment explains the rationale and need for the particular HCM.

The monitoring and evaluation measure EMM-01 specifically addresses the issue raised by the commenter with regard to objectives for snags, green recruitment trees and logs. This monitoring measure states that if the snag strategy required under HCM 3-01G is not sufficient to meet the needs of the Covered Species, the rate of snag creation would be adjusted. The measure requires the collection of monitoring data on the Covered Lands, but it also allows for the use of pertinent data from elsewhere in the region in determining the adequacy of the HCP for cavity-dwelling wildlife.

The HCP does not give specific numeric targets for snag density and size over the long term because there is no general agreement in the scientific community over the appropriate numbers. Rather, the HCP takes a very conservative approach to green recruitment trees, snags, and logs (more than double the current state requirements) and requires monitoring and adaptive management to evaluate the effectiveness of the prescription over time. In addition, all existing snags in the Natural Zone and the Conservation Zone in stands greater that 100 years old (except those considered danger trees within 150 feet for roads) would remain and other snags would be allowed to develop naturally over the life of the HCP.

NGO 5-7

Habitat Conservation Measures 3-01B and 3-01F allow the removal of danger trees within 150 feet of roads in the Natural Zone. While this is expected to result in the removal of a small number of trees, it is necessary to maintain safe conditions along these roads. No other danger tree removal or salvage harvesting would be allowed in the Natural Zone.

If a danger tree must be felled along a road in the Natural Zone, it would be left as log habitat or removed to be used elsewhere to enhance fish and/or wildlife habitat. This provision is clearly stated in HCM 3-01F. The rationale for this provision is that large logs may have limited value as habitat along roads, but greater value as instream large woody debris or upland logs in other portions of the Covered Lands. When dealing with limited resources such as large trees, trade-offs are inevitable. In the case of danger trees felled along roads in the Natural Zone, the trade-off would be between the various conservation measures of the HCP, and the overall objective would be to derive the maximum conservation benefit from the felled trees. Again, the actual number of danger trees removed from the Natural Zone is expected to be small, and the impacts to the habitat value of the zone would be negligible.

Habitat Conservation Measure 3-01B also allows for timber harvesting in the Natural Zone to modify fish and wildlife habitat, but only with prior review by WDFW and written approval of the Services. This provision is included in the HCP to cover 12 small habitat enhancement projects (totaling 83 acres), and large woody debris placement/riparian hardwood conversion along 12.7 miles of streams proposed by Tacoma Water and the USACE as part of the mitigation for the Additional Water Supply Project. These mitigation actions were developed and agreed to prior to preparation of the HCP, and it would not be appropriate to preclude them under the HCP. An alternative would have been to designate these areas as Conservation or Commercial Zone rather than Natural Zone, but Tacoma Water and the Services believe there would be greater long-term benefits to fish and wildlife by providing the areas with the other protections afforded lands in the Natural Zone.

NGO 5-8

See Specific Comment Response NGO 5-7 for background on the development of the provision allowing habitat improvement in the Natural Zone. As specified in HCM 3-01B, any such activities will require written approval of the Services, thereby providing assurance that the objectives of the HCP and the requirements of the ESA are met.

NGO 5-9

See Specific Comment Responses STA 1-86 and STA 1-87.

NGO 5-10

This comment refers to HCM 3-01G, which pertains only to the Commercial Zone and stands less than 100 years old in the Conservation Zone. The suggestion that the minimum log size and density allowed in these managed stands are indicative of the Covered Lands overall is incorrect. The Natural Zone (39.3% of the Covered Lands) and riparian buffers in the Commercial and Conservation zones would be no-harvest, and log volume is expected to be considerably higher than in the managed stands subject to HCM 3-01G. Eventually, the Conservation Zone also would be no-harvest, and log volume would increase there. It is not known whether the HCP would result in average log volumes comparable to those observed elsewhere in the range of the pileated woodpecker, but it is anticipated that large log volume would increase under the HCP, and that the pileated woodpecker population on the Covered Lands would likely increase as well.

NGO 5-11

This comment makes a number of incorrect assumptions. Tacoma Water would not harvest 3,858 acres of mature forest, as assumed in the comment. Tacoma Water would practice even-aged management in the Commercial Zone (which totals 3,858 acres), but most of this zone is currently young second growth. Only about 97 acres of the forest in the Commercial Zone are over 100 years old, and nearly half of that is in riparian buffers or upland management areas that would not be harvested under the HCP. The result is than only about 58 acres of coniferous forest over 100 years old would be clearcut harvested under the HCP.

The comment also assumes that seasonal buffers represent the only management for the Pacific fisher under the HCP. In reality all uplands in the Natural and Conservation Zones, as well as riparian zones (roughly 8,316 acres, or 56%, of the Covered Lands) would be managed to develop and maintain conditions suitable for Pacific fisher denning and hunting. Added to this would be the extensive network of no-harvest riparian buffers in the Commercial Zone. These areas would collectively provide several thousand acres of the type of forest described in the comment (i.e., forest with high canopy closure, abundant large woody debris, and large cavity trees). Pacific fisher dens, if they are present on the Covered Lands, are expected to occur in these mature forest habitats, where they would be protected permanently. Seasonal den site protection is simply a final precaution to minimize the impacts of disturbance that might result from harvest activities in the Commercial Zone and habitat improvement in stands less than 100 years old in the Conservation Zone. Also see Specific Comment Response STA 1-115 for a discussion of habitat conditions for the Pacific fisher under the HCP.

NGO 5-12

See Specific Comment Responses STA 1-127 and NGO 5-11. More than half the Covered Lands will be managed to maintain and enhance late-seral coniferous forest that can serve as nesting and hunting habitat for the northern goshawk. As the amount of habitat increases on the Covered Lands, the population of goshawks is likely to increase as well. Seasonal nest site protection is only a minor part of the overall strategy for goshawk management. It is intended to minimize the impacts associated with the low level of harvest and habitat improvement activity that would go on annually.

NGO 5-13

See Specific Comment Responses STA 1-135 and NGO 5-10.

NGO 5-14

See Specific Comment Response STA 1-138. Impacts to Vaux's swifts would be negligible because snags of sufficient size and age to support the species are uncommon in the second-growth forest that will be harvested under the HCP. Such snags are more likely to occur in mature forest, which will be protected within the Natural Zone. Nevertheless, all safe snags in the Commercial and Conservation Zones would be retained during harvest and habitat improvement activities. In addition, under HCM 3-04T, preference would be given to protecting snags and live trees with the potential to be used by Vaux's swifts.

NGO 5-15

See Specific Comment Responses STA 1-141 through 1-145. Tacoma Water would not harvest "occupied" or "suitable but un-surveyed" marbled murrelet habitat under the HCP. The only potentially suitable marbled murrelet nesting habitat on the Covered Lands is in the Natural Zone, where it will be protected for the term of the HCP. As required by HCM 3-04W, Tacoma Water would also observe seasonal buffers around occupied marbled murrelet habitat on lands adjacent to the Covered Lands. In response to this and other comments on the HCP, HCM 3-04W has been modified to extend seasonal protection to "suitable but un-surveyed" habitat on adjacent lands. This modification would cover the possibility that suitable habitat on neighboring lands might not be surveyed.

NGO 5-16

It is true that the overriding purpose of the ESA is to conserve the ecosystems upon which threatened and endangered species depend, but when Congress amended Section 10 of the ESA it

was its intention that the HCP process and the issuance of ITPs would be used to reduce conflicts between listed species and economic development. To accomplish this the HCP process allows some individuals of a species to be harmed or taken under an ITP, if such take is incidental to otherwise lawful activities and if such take does not appreciably reduce the chances of survival and recovery of listed species in the wild.

Therefore, although Section 10(a)(2)(B) of the ESA via HCPs does allow for the take of individuals of listed species and is not required to contribute to the recovery of listed species; the Services do recognize that HCPs must be consistent with any federal recovery plans for listed species. The HCP must allow for recovery of listed species to occur. In general, the Services believe that HCPs can provide an effective regulatory and management tool for the conservation of listed and unlisted species on non-federal lands.

In the case of this HCP, discussions between Tacoma Water and the Services during the development of the HCP were conducted with the knowledge and understanding that Section 10 issuance criteria for an ITP must ultimately be met before an ITP is issued by the Services. Although the Services have not conducted our final analyses, preliminary analyses suggest that Tacoma Water's HCP would not create an unacceptable level of uncertainty for wildlife resources or create an excessive level of risk to public resources.

NGO 5-17

See Specific Comment Responses NGO 5-1, 5-3, and 5-16.

Comment Responses to Tahoma Audubon Society (NGO 6)

NGO 6-1
See Specific Comment Responses NGO 5-1 and 5-2.

NGO 6-2
Comment noted.

NGO 6-3
Anadromous fish species were blocked from accessing the watershed above Tacoma's Headworks since the early 1900s, and several major conservation measures of Tacoma Water's HCP address the reintroduction of anadromous fish to the upper watershed. Determining which stocks and which species should be considered for reintroduction to the upper watershed is a fish management decision that is beyond the responsibility of Tacoma Water. The WDFW and Muckleshoot Indian Tribe are co-managers of Green River fish and wildlife resources and together with the NMFS and USFWS will evaluate reintroduction of anadromous fish into the upper watershed. However, in order to evaluate potential effects of the HCP, assumptions regarding the distribution and potential for reintroduction above Howard Hanson Dam were defined for each species potentially covered by the ITP. These assumptions were made for planning purposes only and did not represent suggestions by the City of Tacoma regarding fish restoration opportunities.

There are 220 square miles of watershed area and approximately 66 miles of stream and river habitat in the upper watershed that were potentially used by salmon and steelhead. Roughly 24 miles of the 66 miles of stream habitat represent mainstem or large tributary reaches that are suitable for chinook salmon spawning. Although habitat in the Upper Green River Watershed has been degraded by forest harvest activities and construction and maintenance of railroad and power transmission corridors, implementation of upland forest and riparian conservation measures by federal, state, and private landowners will have a positive, long-term effect on upper watershed habitat conditions.

As part of Tacoma Water's proposed conservation measures, implementation of mass wasting prescriptions developed through Watershed Analysis is expected to reduce management-related contributions of coarse sediment. Over the long term, this could reduce the extent of aggraded reaches that consistently experience subsurface flows during dry summers. Reestablishment of riparian forests dominated by coniferous trees greater than 50 years old would increase shade,

moderating elevated summer temperatures caused by lack of adequate shade. Increasing the proportion of riparian stands greater than 50 years of age from 27 to 100 percent would result in a gradual increase in the recruitment of large woody debris. In addition, the increased abundance of late-seral stands is expected to ensure that at least some of the woody debris that enters the stream system is large enough to function as key pieces, which are especially important for forming deep pools in larger channels. Tacoma Water's ownership encompasses most of the mainstem and large tributary habitat preferred as holding habitat by large-bodied salmonids such as chinook, thus temperature reductions and increased woody debris inputs resulting from development of mature coniferous riparian forests on Tacoma Water's lands are expected to be especially beneficial for this species.

NGO 6-4

See General Comment Response 11 concerning the HCP's ability to provide functioning riparian habitat. The Services have found HCPs and the issuance of ITPs to be an effective means of encouraging non-federal landowners to contribute to habitat protection for and restoration of listed species. Requiring a landowner to restore degraded habitat conditions prior to issuing an ITP would be a disincentive for most landowners.

The USFWS criteria for issuance of an ITP are contained in 50 CFR 17.22(b)(2) and 17.32(b)(2). They are: 1) the take will be incidental; 2) the Applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; 3) the Applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided; 4) the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild; 5) the Applicant will ensure that other measures the USFWS may require as necessary and appropriate will be provided; and 6) the Services have received such other assurances as may be required that the HCP will be implemented.

The NMFS issuance criteria contained in 50 CFR 222.22(2) are: 1) the taking will be incidental; 2) the Applicant will, to the maximum extent practicable, monitor, minimize, and mitigate the impacts of such taking; 3) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; 4) the Applicant has amended the conservation plan to include any measures (not originally proposed by the Applicant) that the Assistant Administrator determines are necessary or appropriate; and 5) there are adequate assurances that the conservation plan will be funded and implemented, including any measures required by the Assistant Administrator of the National Oceanic and Atmospheric Administration.

Comment Responses to Center for Environmental Law & Policy (NGO 7)

NGO 7-1

Comment noted. Tacoma Water agrees that protecting the natural functions of the Green River to the greatest extent possible is an important consideration in the use of the river to supply the municipal water needs of Puget Sound communities. Tacoma Water's existing diversion, and its proposed Second Supply Project, admittedly interfere with natural river functions. For that reason, Tacoma Water has spent over a decade, and several million dollars, researching how to balance the use of the river for municipal water supply while protecting natural river processes to the greatest extent possible. The product of this research and extensive coordination with the Muckleshoot Indian Tribe, federal and state resource agencies, local governments, and the public is to be found in Tacoma Water's HCP.

See also General Comment Response 17.

NGO 7-2

See General Comment Response 4.

NGO 7-3

See General Comment Response 27 for a discussion of Tacoma Water's instream flow conservation measures and the desire for natural flow variations.

NGO 7-4

See General Comment Response 17 for a discussion of increasing instream flows to provide additional protection for fish, and General Comment Response 26 for a discussion of the adaptive management provisions of Tacoma Water's HCP.

NGO 7-5

See General Comment Response 26 for a discussion of the adaptive management provisions of Tacoma Water's HCP.

NGO 7-6

See General Comment Response 17 for a discussion of increasing instream flows to provide additional protection for fish, and General Comment Response 26 for a discussion of the adaptive management provisions of Tacoma Water's HCP.

NGO 7-7

As correctly noted in the comment, ESA Section 10 and the No Surprises Policy provide a mechanism for the Services to give Applicants regulatory certainty with respect to federally listed species. In the case of Tacoma Water, that regulatory certainty translates into guarantees as to the withdrawal of water from the Green River as long as conditions specified in the HCP are adhered to. Without those assurances, Tacoma Water could not make the capital improvements necessary to continue meeting the water needs of its customers.

The challenge in developing any HCP is to balance the need of the Applicant for regulatory certainty with the needs of the listed species. The Services believe this balance has been achieved in the case of the Tacoma Water HCP, through a combination of conservation measures and adaptive management. While the results of adaptive management will not result in overall reductions in the amount of water available for withdrawal by Tacoma Water, they may result in changes in the storage and release of portions of that water from behind Howard Hanson Dam. Habitat Conservation Measure HCM 2-02 and Compliance Monitoring Measure CMM-02 commit Tacoma Water to active participation in the development of storage and flow management strategies specifically to benefit fisheries resources in the Green River. While this program is not explicitly identified as adaptive management, it would function as such.

NGO 7-8

See General Comment Response 17 for a discussion of increasing instream flows to provide additional protection for fish, and General Comment Response 26 for a discussion of the adaptive management provisions of Tacoma Water's HCP.

NGO 7-9

Change or modification to the habitat measures committed to in the Tacoma Water HCP would not require approval from Tacoma Water's partners in the Second Supply Project Agreement. Tacoma

Water's HCP commitments to the NMFS and the USFWS are between Tacoma Water and the Services. The partners to the Second Supply Project Agreement would be purchasing the water that is available from the project contingent upon Tacoma Water meeting its HCP commitments. See General Comment Response 15 for additional information.

NGO 7-10

The No Surprises Policy directs the Services and ITP Applicants to address changed circumstances in the preparation of HCPs. The policy defines changed circumstances as changes in circumstances during the course of an HCP that "can reasonably be anticipated and planned for," and instructs that HCPs, "should describe the modifications in the project or activity that will be implemented if these circumstances arise." Subsection 3.2.3 of the Tacoma Water HCP does just that. Future changes with a reasonable chance of occurrence are described, and the actions Tacoma Water would take in response to the changes are identified. When the HCP states that, "No measures beyond those listed below will be required . . .," it is consistent with the No Surprises Policy. The HCP is not saying there will be no response to changed circumstances; it is simply saying that the response will be limited to the actions identified in subsection 3.2.3.

The HCP addresses landslides in subsection 3.2.3.3. As noted in that subsection, provisions to minimize the potential for human-caused landslides on the Covered Lands have already been incorporated into the conservation measures of the HCP. Several of the conservation measures were developed specifically to minimize the potential for landslides, and/or to reduce the environmental impacts of those that occur. Monitoring and adaptive management in response to landslides would occur as part of Watershed Analysis (see HCM 3-03A), which requires regular review and modifications of prescriptions (if necessary) at 5-year intervals. No additional measures are considered necessary in the HCP. The commenter's assertion that there will be no response to landslides is incorrect.

NGO 7-11

See Specific Comment Response NGO 7-10. The IA and HCP are not in conflict. Section 9 of the IA states that Tacoma Water would take the actions listed in HCP subsection 3.2.3 in response to changed circumstances. That same subsection of the HCP lists the required actions, and states that no further actions (beyond those specified) would be required of Tacoma Water. We believe

Tacoma Water's obligations under the HCP, and the Services ability to enforce those obligations, have been adequately stated.

NGO 7-12

Tacoma concurs with the comment that the proposed connection between Seattle and Tacoma does not qualify as an intertie under state law, because an intertie cannot include the development of new sources of supply to meet future demand. However, simply because it does not qualify as an intertie under state law does not mean that a connection between the Seattle and Tacoma Service Areas cannot be developed if such development would include new supplies intended to meet future demand. It simply states that under the definition of RCW 90.03.383, this connection would not qualify as an intertie.

NGO 7-13

See Specific Comment Response STA 2-42.

NGO 7-14

Comment noted.

NGO 7-15

Tacoma has acknowledged that some staff within Ecology believe that an additional water right permit would be required to store water behind Howard Hanson Dam; other staff at Ecology contend that a permit is not necessary. We have also been advised by the USACE that it is their belief that no storage permit is required. If in the future it is determined that Tacoma does need to apply for a water right to store water behind Howard Hanson Dam, then Tacoma would make application for such a permit.

NGO 7-16

Tacoma's current water rights do allow the development of an additional 3,300 acre-feet of storage in the South Tacoma aquifer. This water would be used during the summer in Tacoma during those years when Seattle utilized 10,000 acre-feet of storage at Howard Hanson Dam. Tacoma's conjunctive use of groundwater and surface water allows this flexibility, which in turn provides a significant value to the City of Seattle that would not be possible if the two cities were not joined through the connection between Seattle and Tacoma.

NGO 7-17

The purpose and need of the Proposed Action as stated in subsection 1.2 of the DEIS is to respond to Tacoma Water's permit application in a manner that: 1) provides protection and conservation to listed and proposed species and their habitats to the extent intended under §10(a)(1)(b) of the Act; and 2) allows Tacoma Water to fulfill its water supply obligations in a practical manner. The environmental review process must focus on this Proposed Action, the stated purpose and need for the action, and alternatives to the Proposed Action that will fulfill the purpose and need.

The Proposed Action analyzed in the DEIS is the request for issuance of an ITP from each of the Services. The primary purpose surrounding each alternative to the Proposed Action is to analyze conditions that would affect protected species under the federal ESA, not to permit regional water supplies. As stated in General Comment Response 29, the Services defer to the state of Washington to manage and plan for future growth.

NGO 7-18

The commenter suggests the Services analyze an alternative that does not include the Second Supply Project and therefore prevents Tacoma Water from becoming a regional water supplier. Contrary to the commenter's assertion, the No Action Alternative assumed that Tacoma Water would not pursue the Second Supply Project, and would not become a regional water supplier (see DEIS Table 2-10).

The commenter also suggests we analyze an alternative that includes an HCP without the Second Supply Project component. This was not considered a viable alternative because issuing an ITP without the Second Supply Project would not meet the purpose and need identified by Tacoma Water to fulfill its projected water demands, even within its current service area. Additionally, Tacoma Water would not be able to fulfill its obligations for planned regional supply. These water supply obligations are determined at the state and local levels under Growth Management Act.

See General Comment Response 3 regarding the commenter's suggestion that the alternative they propose should include "an assessment as to whether Tacoma's activities will hinder salmon recovery." The Services' decision-making process does require an analysis of the effects of the Proposed Action on the recovery of listed species. This analysis will be accomplished during preparation of an ESA Section 10 Findings document and an ESA Section 7 Biological Opinion

document. These documents will be prepared following the distribution of the FEIS and prior to ITP issuance.

NGO 7-19

The Services agree the concept of dedicated and non-dedicated storage blocks of water is difficult to follow, but the flow-management benefits of the process made wading through the explanations worthwhile. We found that close review of HCP Figure 5-3 to be particularly helpful in understanding the use of dedicated and non-dedicated blocks of water.

In response to the commenter's stated confusion regarding non-dedicated blocks of water, we offer the following discussion. By Congressional authorization, the USACE must store water at a rate to ensure that prescribed volumes of water have been stored during the spring refill season with a 98 percent reliability. Based on analyses of hydrologic records, the USACE have developed rules to govern the necessary rate of storage. In essence, the reservoir must be filled to a certain level by a calculated date in order to ensure that the full target volume will be stored during the storage window. For instance, in the past the reservoir refill rule has indicated that about 12,200 acre-feet (representing half of the required storage volume of 24,200 acre-feet) be stored by 6 May under average runoff conditions. The volume of stored water that meets the refill rule requirements is considered "dedicated" to that purpose. If water is stored in excess of that needed to meet the refill rule, the excess storage would be considered to be "non-dedicated."

Under the Additional Water Storage Project, the volume of water to be stored would be increased by up to 20,000 acre-feet; however, storage will begin in mid-February, much earlier than previous USACE storage practices. Even with the additional storage requirements, initiating storage in mid-February will provide the opportunity to store water at a rate that exceeds real-time storage requirements. Under the proposed conservation measure, Tacoma Water would contribute funding to have the USACE closely monitor reservoir levels; if water has been stored in excess of that needed to meet refill rules, this non-dedicated water could be subsequently released to manage downstream flows. The non-dedicated portion of the reservoir storage could be released during a late spring drought to augment flows, gradually re-assigned to dedicated blocks of water to reduce later storage requirements, released to increase April and May base flows, or utilized to create a freshet during a late spring period of stable flow, depending on the recommendations of the Green River Flow Management Committee.

This increased flexibility in management of Green River flows appears to be a significant improvement compared to past USACE water storage and release practices.

NGO 7-20

The commenter appears to have misunderstood some of the information provided in the DEIS, although it is difficult for the Services to respond to a specific passage without a page reference. The Services assume this comment refers to the fact that Tacoma Water would have no incentive to prepare an HCP for the upper watershed without the possibility of conducting commercial timber harvesting. This is not a threat; it is a simple statement of fact. Tacoma Water is applying for an ITP to cover, among other things, its timber harvesting and other management activities in the upper watershed. The conservation measures in the HCP specific to the upper watershed are in response to that portion of the ITP. If Tacoma Water were required to cease all timber harvesting in the upper watershed, the risk of incidental take would be negligible, and there would no longer be any need for an ITP. Without an ITP, there is neither the need nor the regulatory mechanism for the Services and Tacoma Water to prepare an HCP. This is not to say that Tacoma Water would not continue to voluntarily implement the conservation measures of the HCP; it simply means that the measures would not be part of any formal agreement between Tacoma Water and the Services. Tacoma Water has already implemented several of the conservation measures on a voluntary basis with no guarantee of an ITP, and the Services would expect no substantial change in the attitude of the City utility if the ITP were not issued.

NGO 7-21

See General Comment Responses 3, 7, and 8.

NGO 7-22

Comment noted. See General Comment Response 4.

NGO 7-23

Tacoma has expressed the intent of continuous compliance with all state regulations regarding conservation on numerous occasions. It is anticipated that state regulations requiring conservation at water utilities will expand in coming years as the importance of water resource conservation and protection becomes more evident. In addition, Tacoma is currently involved in the efforts of the Puget Sound Water Suppliers Forum to develop appropriate criteria for public water utility

conservation programs. However, Tacoma has indicated it does not believe that water derived from conservation alone will be adequate to fulfill the needs of planned regional growth. See General Comment Response 4 for additional information.

NGO 7-24

See General Comment Response 4.

NGO 7-25

Prior to the issuance of any ITP, the Services must ensure that the issuance criteria of Section 10 are met. Among those criteria is the requirement that the proposed incidental take not appreciably reduce the likelihood of the survival and recovery of the Covered Species in the wild. The Services will document the results of their analysis of Tacoma Water's application prior to any decision to issue the permit. If that analysis identifies any needed modifications to the HCP, the Services will ensure those changes are made before the ITP is issued.

NGO 7-26

See Specific Comment Responses NGO 7-1 through NGO 7-25.

NGO 7-27

Comment noted. The Services recognize that society's understanding of the biological and ecological needs of Pacific salmon is continually improving, and will undoubtedly continue to improve with time.

Tacoma Water is proposing to invest approximately $90 million in environmental and ecosystem enhancement and restoration projects to benefit fish and wildlife in the Green River Watershed as a part of its municipal water supply operations and HCP. In addition to its financial investment, the adaptive management component of the City's plan contains provisions that allow the resource agencies a degree of control over modifying river flows to accommodate the varying needs of salmon species and life stages.

Comment Responses to Pacific Crest Biodiversity Project (NGO 8)

NGO 8-1

See General Comment Response 7. The Services are required to process all ITP applications submitted to them. The Services will review the Tacoma Water HCP and IA for compliance with the ITP issuance criteria. See Specific Comment Response NG0 6-4 concerning the issuance criteria for a Section 10(a)(2)(B) permit under the ESA.

NGO 8-2

The Services believe the cumulative assessment provided in Section 4.4 of the DEIS for both wildlife and fish adequately meets NEPA requirements to analyze direct and indirect effects of the Proposed Action on species habitat. Regarding the proposed harvest of 80 acres of forestland, the DEIS specifically analyzes habitat impacts for each of the Covered Species. First, the DEIS assesses related planning efforts aimed at habitat conservation. Secondly, the DEIS summarizes direct and indirect impacts of the Proposed Action on that particular species. Finally, the DEIS combines related planning efforts and impacts to analyze habitat effects within the Covered Lands, province, and western Washington vicinity.

For example, nine separate bald eagle management plans are analyzed that could have a related impact or benefit to individual birds within the vicinity of the Covered Lands. The direct and indirect effect of proposed harvest on bald eagle habitat is then summarized. The analysis of cumulative effects on bald eagles is then detailed for the Covered Lands, Southwest Physiographic Province, and western Washington. This analysis takes into account each of the nine planning efforts as well as proposed harvest levels under the HCP to summarize eagle habitat effects.

We believe this type of analysis adequately meets the goal of the cumulative effects review, which is to analyze and determine the cumulative, regional "conservation contribution" (positive and/or negative) that would result from the Proposed Action for each of the ESA-listed fish and wildlife species covered by the proposed HCP and ITP.

See General Comment Response 30 for a discussion of how the cumulative effects analysis was augmented in the FEIS.

NGO 8-3

See General Comment Response 8.

NGO 8-4

The Services are currently reviewing the HCP and IA for compliance with the Section 10(a)(2)(B) permit issuance criteria. The results of this review will be provided in the Biological Opinion and the findings document.

To assure the quality of the biological, ecological, and other information used in the implementation of the ESA, it is the policy of the Services to: 1) evaluate all scientific and other information used to ensure that it is reliable, credible, and represents the best scientific and commercial data available; 2) gather and impartially evaluate biological, ecological, and other information disputing official positions, decisions, and actions proposed or taken by the Services; 3) document their evaluation of comprehensive, technical information regarding the status and habitat requirements for a species throughout its range, whether it supports or does not support a position being proposed as an official agency position; 4) use primary and original sources of information as the basis for recommendations; 5) retain these sources referenced in the official document as part of the administrative record supporting an action; 6) collect, evaluate, and complete all reviews of biological, ecological, and other relevant information within the schedules established by the Act, appropriate regulations, and applicable policies; and 7) require management-level review of documents developed and drafted by the Services' biologists to verify and assure the quality of the science used to establish official positions, decisions, and actions taken by the Services during their implementation of the Act [59 FR 3471 (July 1, 1994)].

The Services have carefully considered all of the factors noted above and believe that the information presented in the DEIS, draft HCP, and supporting documents does represent the best scientific and commercial data available.

NGO 8-5

See Specific Comment Responses NGO 5-3 and NGO 5-6. Contrary to the suggestion in the comment, an HCP is not required to "fully" mitigate impacts or to contribute to recovery. As stated in the ITP issuance criteria (provided in Specific Comment Response NGO 6-4), the permitted taking must not appreciably reduce the likelihood of the survival or recovery of the species in the wild.

NGO 8-6

See General Comment Response 25 and Specific Comment Responses NGO 5-3 and NGO 5-6. Measurable resource objectives are provided within the various habitat conservation measures in HCP Chapter 5. The effects of the conservation measures are described in HCP Chapter 7. Further analyses of the effects of the HCP on the Covered Species are provided in DEIS Section 4.0. Lastly, the Services will complete additional analyses as part of the Biological Opinion and findings document that will be prepared before any ITP is issued.

NGO 8-7

The primary issue in the case *Sierra Club vs. Bruce Babbitt, et al.* was that the effects of the HCP did not analyze the cumulative effects of the project on the larger population and habitat in the range of the Alabama beach mouse. The analysis for the Tacoma Water HCP is different from the above case in that an EIS was prepared that looked at the cumulative effects of implementing the HCP on each of the Covered Species (DEIS subsection 4.13). The cumulative effects analysis considered other landscape management in the southwest Cascades (Northwest Forest Plan and other HCPs) that will affect the populations and habitat of the Covered Species. The analysis shows that the Covered Lands cover a small proportion of the potential habitat in the Southwest Cascades Physiographic Province, and that the majority of habitat for these species is also covered under the other landscape management in the province (DEIS subsection 4.4.3).

Unlike the Alabama beach mouse case that involved mitigating for the permanent loss of habitat, the Tacoma Water HCP primarily modifies how management activities are conducted on the Covered Lands. The result of management under the Tacoma Water HCP is a maintenance or improvement of habitat conditions for all of the Covered Species in comparison to current conditions and the No Action Alternative (see the effects analysis in the HCP, Section 7.0, and in the FEIS, Section 4.0).

There are also biological differences between the Alabama beach mouse and the species covered under the Tacoma Water HCP. The Alabama beach mouse has a restricted range that is not well defined. The percent of the range of the mouse impacted by the HCP was not known, and the effects upon the larger mouse population were not analyzed. In contrast, the Covered Species are not unique to the state of Washington, and the Covered Lands constitute only a small percentage of the potential range for these species in Washington. The state of Washington has modeled the extent of habitat in core and peripheral zones for all of the Covered Species (Johnson and Cassidy 1997; Smith et al. 1997). Core and peripheral habitats for the Covered Species are well distributed throughout the North Cascades and/or the western Washington lowlands. The Covered Lands encompass only small portions of the potential ranges of the species in Washington.

NGO 8-8

The Services recognize that the current habitat conditions are representative of past management practices that degraded the habitat. The Tacoma Water HCP has been designed to increase the amount and quality of habitat available to the Covered Species. For example, the HCP would increase riparian function and the number and size of snags. The use of current conditions as a starting point for management is appropriate in the Services' opinion.

NGO 8-9

See General Comment Response 28 regarding use of best available science by Tacoma Water in its HCP and EIS analyses.

NGO 8-10

See Specific Comment Response IND 39-5 concerning the value of thinning even-aged stands to promote late-seral forest characteristics.

NGO 8-11

The intent of the proposed thinning is not to create old-growth, but to promote late-seral forest characteristics (e.g., large trees, large snags, large logs, a well-developed shrub and forb layer, and a multi-storied overstory). There is little dispute that thinning promotes tree growth and increases understory shrub development. Large trees can provide nesting and roosting habitat for species such as the northern spotted owl, pileated woodpecker, and Pacific fisher. Large-diameter branches that

may be used by nesting marbled murrelets develop on widely spaced trees (Maquire et al. 1991, as reported in Hayes et al 1997). Large trees with large-diameter limbs will eventually develop large woody debris that can be used by the majority of the Covered Species.

Thinning even-aged conifer stands has been documented to benefit a number of wildlife species. Hager et al. (1996) reported the abundance of breeding birds was greater in thinned stands 40 to 50 years old than in unthinned stands. Stands that had been pre-commercially and commercially thinned were found to have higher than expected species richness of terrestrial amphibians and almost twice the total number of captures at harvest age than other stand structure (Aubry 1997).

NGO 8-12

See General Comment Response 26. Adaptive management is integral to several of the conservation measures, as described in HCP Chapter 6.

NGO 8-13

The Tacoma Water HCP is a habitat-based HCP. The success of the HCP will be assessed according to whether or not it results in the creation and maintenance of habitat for the Covered Species. The maintenance of wildlife populations is dependent on a number of factors other than the availability of habitat, and most of these are beyond the control of landowners like Tacoma Water. For that reason the Services will not require the measurement or monitoring of wildlife populations under the HCP.

In those instances where the implementation of certain habitat conservation measures is triggered by the presence of the Covered Species (e.g., grizzly bear seasonal den site protection), the obligation for detecting the species will be shared by Tacoma Water, the WDFW, and the USFWS. The level of training and reporting provided by HCM 3-04B and 3-04V will be sufficient to satisfy Tacoma Water's obligations.

NGO 8-14

The monitoring and reporting schedules in HCP Chapter 6 will be sufficient to verify compliance. Effectiveness monitoring will also occur for those areas where it is considered necessary (snag creation and site-specific species protection plans). Given the extremely low level of incidental take

expected to occur under the ITP and the conservative nature of the habitat creation and protection measures in the HCP, no additional habitat monitoring is warranted. The need for population monitoring is precluded by the habitat-based nature of the HCP.

NGO 8-15

See General Comment Response 7 and Specific Comment Response NGO 5-5. The Tacoma Water HCP would not be used to eliminate or degrade habitat for any of the Covered Species. The Services have found HCPs and ITP to be an effective means of encouraging non-federal landowners to contribute to species conservation. The Services are also required to review any ITP application that is submitted and to determine whether it meets the issuance criteria (see Specific Comment Response NGO 6-4 concerning the issuance criteria). If the HCP and IA meet the issuance criteria, the Applicant will be issued an ITP.

NGO 8-16

See General Comment Responses 5 and 7, and Specific Comment Response NGO 5-5.

NGO 8-17

The HCP would result in the harvest of a very small amount of mature coniferous forest in the short term (approximately 58 acres over 100 years old). As mitigation, 7,812 acres of Tacoma Water lands (including several hundred acres that currently support mature coniferous forest) would be dedicated to the long-term development and maintenance of late-seral forest characteristics.

It is difficult to categorically state that the standard for issuing an ITP is higher than the standards of the Washington Forest Practices Rules or the Tacoma Water Forest Land Management Plan, particularly in light of the recent modifications to the state rules and the conservative nature of the Tacoma plan. It is accurate, however, to state that the standards are different. The standards pertinent to an ITP are the issuance criteria provided in Section 10(a)(2)(B). The Services will verify that the Tacoma Water HCP meets the issuance criteria before any ITP is issued. While one of the criteria requires that issuance of the ITP not appreciably reduce the likelihood of the survival and recovery of the Covered Species in the wild, the ITP does not require that the HCP contribute to recovery. It is anticipated the Tacoma Water HCP will contribute to the recovery of several of the Covered Species, even though it is not required to do so.

NGO 8-18

See General Comment Response 2.

NGO 8-19

See General Comment Responses 7 and 9, and Specific Comment Responses NGO 5-5 and NGO 8-11.

NGO 8-20

The Services agree that timber harvesting and road construction can affect hydrology and surface water quality. If conducted improperly, these activities can have serious negative environmental effects. For that reason, the Services have worked closely with Tacoma Water to develop the road management and timber harvesting measures in the HCP. The conservation measures in the HCP meet or exceed levels considered necessary to protect water quality and maintain healthy fish and wildlife populations.

The current functions of Howard Hanson Dam (flood control, fish enhancement, and water supply) and the proposed additional function under the Additional Water Storage Project would not be precluded by cessation of timber harvesting on Tacoma Water lands. The City owns roughly 10 percent of the Upper Green River Watershed, and would conduct harvesting on less than 1 percent of its holdings (less than 0.1 % of the upper watershed overall) annually. This level of timber harvesting would have a negligible effect on the hydrologic regime of the watershed, regardless of how it was conducted. If conducted in accordance with the conservation measures of the HCP, the anticipated level of timber harvesting and road construction would also have a negligible effect on sediment input to the Green River. There is certainly no potential for "massive imbalances in the natural soil-forming and erosion cycles," as suggested in the comment.

NGO 8-21

See General Comment Response 7 and Specific Comment Response NGO 5-5. The Services anticipate no "ecological damage" to the Upper Green River Watershed as a result of the Tacoma Water ITP and HCP.

NGO 8-22

See General Comment Response 7. The HCP would result in a substantial increase in the amount of late-seral coniferous forest on Tacoma Water lands. In the short term, all but 58 acres of the existing mature coniferous forest would be protected from timber harvesting. Over the long term, more than 8,316 acres (roughly 56% of the Covered Lands) would be managed to protect and enhance late-seral forest characteristics. The Services anticipate that this level of habitat protection will satisfy Tacoma Water's obligations under Section 10 of the ESA, and significantly contribute to the recovery of listed species covered by the ITP.

NGO 8-23

See General Comment Response 8.

NGO 8-24

Tacoma Water is proposing no harvest of suitable marbled murrelet nesting habitat under the ITP. Habitat Conservation Measure 3-04W addresses potential impacts to marbled murrelets nesting on lands adjacent to the Covered Lands. In response to comments during public review of the HCP, the measure has been revised so that disturbance protection measures would be implemented around all suitable marbled murrelet nesting habitat that has been determined to be occupied or to have murrelet presence, or that has not been surveyed.

Under the HCP Tacoma Water would manage 52 percent of the Covered Lands for late-seral forest conditions, and maintain no-harvest buffers on several hundred additional acres in the Commercial Zone. Much of this late-seral forest would eventually develop conditions suitable for nesting by marbled murrelets, although it may take more than 50 years for such conditions to appear. This increase in the amount of potential marbled murrelet nesting habitat on the Covered Lands would represent a substantial contribution to the restoration of marbled murrelet habitat in the Upper Green River Watershed.

NGO 8-25

The HCP is consistent with the Final Draft Spotted Owl Recovery Plan and the objectives for the Spotted Owl Special Emphasis Area established in the Upper Green River Watershed by the DNR. Tacoma Water would harvest an estimated 58 acres of mature coniferous forest in the short term,

while protecting and enhancing potential spotted owl habitat on more than 7,700 acres over the long term. The Covered Lands would contribute to the support of the local spotted owl population in the watershed, and the connectivity between populations to the north, south, and east of the watershed.

NGO 8-26

See Specific Comment Responses STA 1-127 through STA 1-134, NGO 5-5, and NGO 8-8. Thinning is not the only conservation measure for northern goshawks in the HCP; it is only one of several measures that would be used. The HCP actually employs four sets of conservation measures that will benefit the northern goshawk. First, all existing forest in the Natural Zone would be protected from timber harvest and other alteration. Second, young forest in the Conservation Zone would be thinned to accelerate the development of large trees, large snags, and small forest openings (all of which are important features of goshawk habitat). Once stands in the Conservation Zone reach 100 years of age, they would be protected from all timber harvesting similar to the Natural Zone. Third, management of the Commercial Zone would include extensive no-harvest riparian buffers, 70-year harvest rotations, and substantially increased rates of live tree, snag, and log retention (compared to standard forest practices). This management of the Commercial Zone is expected to provide nesting and hunting habitat for goshawks throughout the zone. Lastly, Tacoma Water would restrict public access to the Covered Lands and implement seasonal and long-term buffers around active goshawk nests to minimize human disturbance of these key sites. As noted in the comment, goshawks are considered to be sensitive to human disturbance.

NGO 8-27

See Specific Comment Responses STA 1-115 through STA 1-117. The HCP would result in a substantial increase in the amount of potential habitat for the Pacific fisher in the Upper Green River Watershed. Over 8,316 acres of the Covered Lands in the Natural and Conservation Zones would eventually provide closed-canopy forest conditions suitable for fisher, mostly along riparian areas. Thinning in the Conservation Zone would allow trees to achieve larger sizes faster than under natural development and will reduce the period of time a stand is in the stem exclusion stage. These zones will provide a framework of closed-canopy forest that can be used by fisher for movement up and down the Green River in the upper watershed. However, conservation and recovery of the Pacific fisher cannot be achieved on Tacoma Water lands alone. The fisher's home range has been reported to be relatively large, ranging in size from 961 acres to 19,840 acres (Powell and Zielinski 1994).

The eventual recovery of the fisher in the Upper Green River Watershed would require contributions from other landowners, and these would come as a result of the Northwest Forest Plan, the DNR's HCP, and the newly adopted riparian management strategies of the Forest Practices Rules.

NGO 8-28

Thinning in the Conservation Zone would occur primarily in the first few decades of the HCP (before stands reach the age of 100 years). Use of these areas by fisher is expected to be low during that time because of the absence of the species from the watershed. The eventual development of late-seral characteristics in these areas would be beneficial to fisher if they become more numerous in the future. If fisher require young forest for foraging, they would find ample habitat in the Commercial Zone and on other commercial timberlands in the upper watershed.

Windthrow is a prevalent issue in western Washington, and it is known to be increased by some types of timber harvesting. A certain amount of windthrow is desirable, as it contributes to the structural diversity of a forest. Excessive windthrow, however, can delay or retard the development of late-seral forest characteristics. The thinning prescription proposed by Tacoma Water is expected to be sufficiently conservative to avoid excessive windthrow. As a further precaution, HCM 3-01C has been modified and EMM-03 has been added to require monitoring and adaptive management of the commercial thinning program. The method and intensity of thinning would be modified if windthrow is excessive.

NGO 8-29

The Pacific fisher is documented to use low- to mid-elevation forests, avoiding areas susceptible to deep snow (Aubry and Houston 1992). In Washington, fisher have been reported to occur as high as 5,900 feet in elevation, but most sightings (87%) occur below 3,200 feet. These elevation constraints would limit the use of portions of the Upper Green River Watershed, which reaches an elevation of 5,000 feet.

The home ranges of individual fisher are relatively large, ranging from 1.5 to 31 square miles. Fisher prefer dense conifer forests with high structural diversity on the forest floor, and riparian or wetland conditions (Brown 1985; Aubry and Houston 1992; Powell and Zeilinski 1994; Maser 1998). While management conditions are expected to increase the amount of preferred fisher

habitat, the combination of fragmented habitat and the fisher's relatively large home range would further limit the population density in the Upper Green River Watershed.

The Tacoma Water HCP is a prescription-based plan that is not required to monitor population levels of the Covered Species. The impacts to the fisher are measured by changes in habitat conditions. The commenter is reminded that recovery is not one of the issuance criteria for an ITP (see Specific Comment Response NGO 6-4).

NGO 8-30

See General Comment Responses 7 and 8. The HCP is a comprehensive plan for the protection of water quality and habitat on Tacoma Water lands in the Upper Green River Watershed. The Services do not believe that additional restrictions on timber harvesting are necessary to satisfy the requirements for issuance of an ITP.

The lands surrounding Kelly Butte are neither owned nor controlled by Tacoma Water. The Services are not in a position to require that Tacoma Water purchase these lands.

Tacoma Water does own unroaded lands at the bottom of Lester Creek and Sawmill Creek (approximately 2 miles north of Kelly Butte) that are designated Natural Zone and Conservation Zone under the HCP. As specified in HCM 3-01B and 3-01C, no timber harvesting would occur in the Natural Zone, and timber harvesting in the Conservation Zone would occur only to accelerate the development of late-seral forest characteristics.

Tacoma Water also owns portions of three sections along lower Sawmill Creek (roughly 2.5 miles north of Kelly Butte) that are designated as Commercial Zone. These areas are roaded and were clearcut harvested in the early 1990s. Given the target rotation age of 70 years under the HCP, no even-aged harvest is likely to occur in these young forest stands during the next 50 years, regardless of the fact that they are in the Commercial Zone.

Tacoma Water lands along the upper Green River in Sections 21 and 27, Township 20 North, Range 11 East are in a similar condition. They are designated Commercial Zone and were harvested in the early 1990s. Some of this land on moderate terrain may be commercially thinned within 50 years;

however, even-aged harvest would not take place until they are at least 70 years old. A change in designation would have little effect on their management under the HCP for the next 50 years. Tacoma Water does not currently hold the timber rights for these lands, however, and a Natural Zone designation would be in conflict with Tacoma Water's obligation to the holder of those rights.

All Tacoma Water lands along Friday Creek and McCain Creek are designated as Natural Zone or Conservation Zone. No timber harvesting would occur in the portion that is Natural Zone, and little is likely to occur in the portion that is Conservation Zone because it is primarily unforested power line right-of-way.

Tacoma Water lands around Eagle Lake and lands along lower Champion and Rock Creeks are combinations of Natural, Conservation, and Commercial Zones. All lands directly adjacent to the lake are Natural or Conservation Zone, and all lands along the Green River are Natural Zone. The only lands designated as Commercial Zone are those with little or no potential to influence water quality. Cessation of timber harvesting on these lands would not be necessary to achieve the conservation goals of the HCP or to satisfy the ITP issuance criteria of the ESA.

NGO 8-31

The Services believe that the length of new road constructed on Tacoma's lands in accordance with the HCP requirements will be limited and that conservation measures governing construction of new roads on the Covered Lands under Tacoma's HCP are sufficient to minimize increases in sediment delivery and habitat fragmentation. Roads on Tacoma's lands that are not needed by other landowners or for Tacoma's timber harvest program, water quality monitoring, or other administrative purposes will be identified and abandoned within 5 years as stipulated in HCM 3-03J. However, Tacoma is required by legal agreement to provide other landowners access to its lands either on existing roads or through easements to construct new roads across Tacoma's land. Tacoma will require that any new roads constructed on the Covered Lands by other landowners meet the standards stipulated by its HCP. In addition, by working cooperatively with other landowners to develop a watershed-wide transportation plan, Tacoma expects to identify how the existing road network may be used most efficiently, thereby limiting the need for construction of new roads.

See General Comment Response 10 for additional discussion of Tacoma Water's proposed road management and road abandonment program.

NGO 8-32

Tacoma Water does not hold sufficient land in the Upper Green River Watershed to direct any of the state-level Watershed Analyses that are being conducted. Similarly, Tacoma Water and the Services lack the authority to revise state policies and procedures for preparing a Watershed Analysis. Tacoma Water has chosen to address terrestrial habitat issues on its lands through the development of the Forest Land Management Plan and the HCP. For purposes of the ESA, the Services consider this approach to be appropriate.

NGO 8-33

The conservation "standards" for HCPs are not established by management plans on federal lands. Rather, it has been the Services' approach that the Northwest Forest Plan form the backbone of forest species conservation in the Pacific Northwest, and that HCPs be tailored to complement the efforts being carried out on those federal lands. The "standards" for HCPs are clearly spelled out as five issuance criteria in section 10(a)(2)(B) of the Act.

See General Comment Response 11 for a discussion of Tacoma Water's proposed riparian management measures and the strategy for achieving properly functioning riparian habitat. See General Comment Response 7 for a discussion of Tacoma Water's upper watershed management program and its role in commercial logging. See General Comment Response 10 for a discussion of Tacoma Water's proposed road management and road abandonment program.

NGO 8-34

The comment reflects a misunderstanding of the HCP. The Conservation Zone would not be harvested on a 100-year cycle. Stands less than 100 years old in the Conservation Zone would be thinned to accelerate the growth of large trees. Once stands reach 100 years of age, there would be no further harvesting of any kind, except danger tree removal along roads. No thinning would be conducted in stands that are currently over 100 years old in the Conservation Zone.

No harvesting would occur in the Natural Zone for the full term of the HCP, except for minor habitat improvement projects and the removal of danger trees along roads. This restriction applies to all lands in the Natural Zone, including those recently acquired from the USFS. Extension of this harvesting restriction beyond the term of the HCP (i.e., 50 years) would not be appropriate without a comparable extension of the ITP. Since a number of commenters have stated that they feel the proposed 50-year term is too long, the Services are not at this time considering an extension of the term.

The Services do not consider it necessary for Tacoma Water to acquire additional cutting rights from Plum Creek Timber Company as part of the HCP, but nothing in the HCP or ITP would preclude Tacoma Water from pursuing those rights on its own.

NGO 8-35

See General Comment Responses 3, 5, and 7.

NGO 8-36

See General Comment Responses 7, 8 and 10, and Specific Comment Response NGO 5-5.

NGO 8-37

Monitoring and adaptive management are described in detail in HCP Chapter 6. The Services consider the prescribed levels of monitoring and adaptive management appropriate to the anticipated level of incidental and the conservative nature of the HCP.

Contrary to the suggestion in the comment, monitoring is done to verify compliance and facilitate adaptive management, not to respond to unforeseen circumstances. By definition, unforeseen circumstances are those that cannot be anticipated or planned for. As a practical matter, it would be impossible to design a monitoring program to address circumstances of unknown nature and unpredictable occurrence.

NGO 8-38

The primary benefit of the ITP to Tacoma Water will be the management certainty it will provide. As long as Tacoma Water complies with the HCP and other conditions of the IA, it will have

certainty that it can carry out the covered activities without further restrictions under the ESA. Public involvement in the HCP occurs prior to issuance of the ITP, through attendance at public meetings and review of the draft documents. Any requirement to solicit continued public involvement throughout implementation of the HCP would diminish the certainty sought by Tacoma Water, and substantially reduce the incentive for the City of Tacoma to implement the HCP.

NGO 8-39

See General Comment Responses 5 and 7.

Comment Responses to Friends of the Earth (NGO 9)

NGO 9-1

Comment noted.

NGO 9-2

See General Comment Response 30.

NGO 9-3

Discussions with the City of Tacoma and the Services during the development of the HCP were conducted with the knowledge and understanding that issuance criteria (see General Comment Response 3) must ultimately be met before an ITP issued by the Services. One of these issuance criteria requires Tacoma to minimize and mitigate to the maximum extent practicable the impacts of the taking. This requirement does not necessarily prevent Tacoma from continuing to withdraw water from the Green River or from harvesting timber on its lands in the Green River Watershed, it only requires that activities for which Tacoma is seeking incidental take coverage be consistent with all issuance criteria Section 10(a)(2)(B) of the ESA.

The determination as to whether Tacoma's proposed HCP and ITP have met the issuance criteria will be made after the FEIS and Final HCP have been revised based on public input during the original 78-day comment period, and subsequently released for a second 30-day public review period. If at that time issuance criteria are met, the determination to issue a permit will be documented in the Services' decision documents consisting of the ESA Section 10 findings, ESA Section 7 biological opinions, and a NEPA record of decision.

NGO 9-4

See General Comment Response 4.

NGO 9-5

Tacoma Water has requested coverage under Section 10 of the ESA for the effects of its activities on Covered Species. These activities primarily involve management of approximately 10 percent

of the Upper Green River Watershed and withdrawal of water under its First Diversion Water Right claim and its Second Diversion Water Right at the Headworks facilities at RM 61.0. Howard Hanson Dam at RM 64.5 is a federal facility; project operations, including the storage and release of water, are federal activities. Federal activities cannot be covered by a Section 10 ITP of the type being requested by Tacoma Water. Consequently, the Services are only able to evaluate the effects of Tacoma Water's proposed water withdrawal, watershed management, and conservation measure activities.

The effects of Tacoma Water's activities on natural ecosystem habitat functions within the Green River Basin have been identified in HCP Chapter 7. The Services will review the results of Tacoma Water's analyses and consider the degree to which Tacoma Water's habitat acquisition, enhancement, protection and restoration serve to protect Covered Species and habitats.

NGO 9-6

Comment noted. In 1986, Ecology issued the City of Tacoma a water right for 100 cfs following adoption by Ecology of its Green-Duwamish River Basin Instream Resources Protection Program (IRPP). The IRPP establishes instream flows for the Green River measured at the USGS gauges at Palmer (No. 12.1067) and Auburn (No. 12.113000), and subjects future water right holders to regulation at one of the two gauges. After much study, and following a thorough review of protests to the issuance of the water right, the State Pollution Control Hearings Board and Ecology concluded that the water right was consistent with the intent of RCW 90.54.020 (2): *"Allocation of waters among potential uses and users shall be based generally on the securing of the maximum net benefits for the people of the state. Maximum net benefits shall constitute total benefits less costs including opportunities lost."*

Ecology published its IFIM Technical Bulletin entitled *Green River Fish Habitat Analysis Using the Instream Flow Incremental Methodology* in July 1989.

Flow-survival studies have been conducted for salmonids in the Green River. For the results of these studies, see Section 4.0 of the DEIS.

NGO 9-7

We have reviewed the referenced document and will consider the concerns identified by the authors of *Using Science in HCPs* when deliberating whether to issue Tacoma Water an ITP.

NGO 9-8

See General Comment Response 1.

NGO 9-9

Your name has been added to the federal list for final HCP and FEIS distribution. You may also review the final documents on our website at http://www.rl.fws.gov/.

NGO 9-10

Tacoma's System Development Charges are designed to recover 50 percent of the cost of source storage, transmission and treatment to serve new customers. The remainder of these costs is included in rates charged to all customers. Rate structure and System Development Charges structure are the prerogative of the Tacoma Public Utility Board and the Tacoma City Council and are designed to reflect a variety of public policy issues including those raised in this comment.

NGO 9-11

The collection of depreciation costs is a practice carried out by private utilities using a "utility basis" accounting. As a publicly owned utility, Tacoma practices "cash basis" accounting, which does not include the collection of cash for depreciation costs. However, the concern for future ratepayers and responsible financial management is still valid. Tacoma has indicated it concurs with the need to adequately fund capital projects and pay down debt.

NGO 9-12

It is noted that Tacoma's maximum day demand is less than twice average day demand. This appears to be a fairly low peak-to-average day ratio based on the ratio of other utilities. This is driven by Tacoma's significant industrial demand, which tends to negate the peaking effect of residential customers. In fact, most of Tacoma's residential users are affected by higher residential rate blocks since they peak at a similar ratio to residential users in other Washington cities.

NGO 9-13

See General Comment Response 5 and 7, also Specific Comment Responses NGO 5-5 and NGO 10-66.

NGO 9-14

See General Comment Response 5.

Comment Responses to Sierra Club, Cascade Chapter (NGO 10)

NGO 10-1

Comment noted.

NGO 10-2

The destruction of habitat that harms threatened and endangered species, otherwise referred to as "take," is prohibited by Section 9 of the ESA. Congress amended Section 10 of the ESA in 1982 to authorize the Services to issue permits to non-federal entities authorizing the "take" of listed species. The take authorized must be "incidental" to otherwise lawful activities and conducted in accordance with an approved HCP. An ITP is issued if an HCP meets specific criteria set forth in Section 10. For species covered by an ITP, the accompanying HCP must: minimize and mitigate the impacts of the proposed take to the maximum extent practicable, and not appreciably reduce the likelihood of survival and recovery of the species in the wild. Therefore, the comment that take should not be allowed as part of this HCP appears to reflect a criticism of the mechanism created by Congress in Section 10 of the ESA to authorize incidental take of listed species and the legal standards for such permits. The Services do not have the authority to change amendments to the ESA that Congress has authorized and, therefore, can only work within the framework of the Act as amended by Congress.

NGO 10-3

Given the importance of non-federal land in the conservation of threatened and endangered species, the Services recognized the need to provide adequate incentives for non-federal landowners to factor endangered species conservation into their day-to-day land management activities. Economic and regulatory certainty regarding the overall cost of species conservation and mitigation is of great concern to non-federal property owners. To alleviate this concern and provide meaningful conservation for listed species, the Services believe that it is appropriate to provide HCP Applicants the incentive of regulatory certainty provided the affected species are adequately covered by a properly functioning HCP. This incentive is captured in the "No Surprises" rule (63 FR 8859). Summarized, the rule states that private landowners are assured that if "unforeseen circumstances" arise, the Services will not require the commitment of additional land, water, financial

compensation, or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed to in the HCP without the consent of the permittee. The Services also believe that in order to provide sufficient incentives for the private sector to participate in the development of long-term conservation plans, adequate assurances that a Section 10(a)(1)(B) permit can be issued for the life of a project must be made to non-federal entities that choose to develop HCPs.

NGO 10-4 through NGO 10-6

Refer to General Comment Response 1.

NGO 10-7

Adaptive management for Covered Wildlife Species is generally unnecessary because of the extremely conservative nature of the HCP. Only 21 wildlife species would be covered by the ITP, and the level of incidental take is anticipated to be minimal for all 21 species. As mitigation, Tacoma Water would make substantial contributions to the long-term conservation of these species by dedicating roughly 74 percent of the Covered Lands (52% of which are upland forest) to habitat reserves. Natural habitat-forming processes would be allowed to occur in these zones, with limited amounts of management for habitat enhancement. The remaining 26 percent of the Covered Lands would be managed with low levels of commercial timber harvest, and high levels of residual tree, snag, and log retention. The only area of minor uncertainty relative to long-term conservation benefit is the snag creation program in the Commercial and Conservation Zones. Consequently, this is the focus of adaptive management in the HCP (see EMM-01).

Adaptive management for Covered Aquatic Species is described in General Comment Response 26.

NGO 10-8

Tacoma wishes to insure that its actions on the Green River are in compliance with the ESA. If it operates in accordance with an approved HCP, then this requirement would be met. Without such assurance, Tacoma has stated that it cannot afford to commit the significant resources that are required for the water supply and environmental improvements proposed in this HCP.

Although the protection provided to Tacoma by an HCP is significant, it is not all-encompassing. The Services still have the ability to compel changes in operation by Tacoma in the event of a determination of jeopardy to endangered species as a result of that operation. In addition, Tacoma has historically modified its operations at the request of resource agencies to reduce the use of water from its existing water rights for resource protection. This has happened numerous times in recent years.

NGO 10-9

See Specific Comment Response NGO 10-7. Effectiveness Monitoring Measure EMM-01 requires that data on snag recruitment and persistence be collected on the Covered Lands, and that adjustments be made to the snag creation program if necessary to provide for the needs of cavity-nesting wildlife species covered by the ITP.

Adaptive management for Covered Aquatic Species is described in General Comment Response 26.

NGO 10-10

The levels of adaptive management required under the HCP are anticipated to be both adequate to meet the issuance criteria of ESA Section 10, and appropriate to the specific environmental and economic conditions of the Green River. Section 10 is intended to provide regulatory assurances to landowners that meet the specified issuance criteria and provide mitigation appropriate to the anticipated level of incidental take. If there were no limits on the amount of adaptive management required of an ITP holder, there would essentially be no regulatory assurances. Without those assurances, a landowner would have little or no incentive to pursue an ITP and prepare an HCP.

See General Comment Response 26 for a discussion of adaptive management and protection of aquatic species, and General Comment Response 17 for discussion of instream flows and aquatic resource protection.

NGO 10-11

We are aware of the referenced documents and consider the guidelines when developing or reviewing endangered species conservation efforts. See General Comment Response 26 regarding the adaptive management provisions of Tacoma Water's HCP.

NGO 10-12

The compliance monitoring measures are designed to provide us with confirmation that the conservation measures have been implemented as specified in the HCP. Tacoma Water's obligations to comply with the instream flow measures identified in HCMs 1-01 and 1-02, and our response in the event of non-compliance are identified in the IA. Should Tacoma Water fail to comply with the terms of the conservation measures, the Services' responses are outlined in IA Paragraphs 6.2, Permit Suspension or Revocation, 6.3, Relinquishment of the Permit, and 14.0, Remedies, Enforcement, and Dispute Resolution.

NGO 10-13

The conservation measure contingencies vary between measures depending on the Proposed Action and anticipated likelihood of success of the original measure. Wood placed under HCM 1-05 would be sized according to the intended function and channel dimensions. As noted in HCM 1-05, Tacoma Headworks Large Woody Debris/Rootwad Placement, "Structures that are deemed non-functional as a result of high flows would be modified or replaced by Tacoma as needed within the first 5 years following construction." This commitment would ensure that if wood placed initially proves to be too small to remain stable for at least 5 years, then the design would be modified such that structures are of a sufficient size to remain stable. Once it has been determined that the structure design is sufficient to remain stable and functional for at least 5 years, we do not anticipate that structures would need to be replaced more than once over the remaining term of the HCP.

NGO 10-14

The wildlife strategies in the HCP were designed to minimize the need for effectiveness monitoring. The strategy has three major components: 1) maintenance and enhancement of native late-seral coniferous forest on portions of the Covered Lands (the Natural and Conservation Zones) with minimal human intervention; 2) maintenance of late-seral coniferous forest habitat elements in intensively managed portions of the Covered Lands (the Commercial Zone) in a manner consistent with commercial timber production; and 3) minimization of impacts of human activity on the Covered Lands by observing seasonal and long-term buffers around sensitive areas such as dens, nests and key foraging areas. The ability of late-seral coniferous forest to support species native to that type of habitat is somewhat axiomatic. If effectiveness monitoring is necessary to demonstrate that unmanaged forest is capable of supporting native wildlife, such monitoring is beyond the scope of the Tacoma Water HCP. The effectiveness of leaving residual live trees, snags and logs in the

Commercial Zone is subject to debate, and effectiveness monitoring has been included in the HCP specifically to address that issue (see EMM-01). Seasonal and long-term disturbance buffers around nests and dens also warrant monitoring, and that monitoring would occur under EMM-02. The objective of disturbance buffers, as stated in EMM-02, is to reduce the potential for human activity to disrupt the specific wildlife activities occurring in the buffered areas. The monitoring required under EMM-02 would evaluate whether that objective is being met.

See General Comment Response 25 for further discussion of quantifiable data and resource objectives in the HCP. In response to the specific request for quantifiable objectives for gravel nourishment, note that Type 2 conservation measures, such as HCM 2-09, Mainstem Gravel Nourishment, consist of contribution of funds and/or implementation of measures designed to offset or compensate for impacts resulting from non-Tacoma actions. Habitat Conservation Measure 2-09 is designed to partially restore gravel transport functions in the Middle and Lower Green River caused by the USACE's Howard Hanson Dam. Under HCM 2-09, up to 3,900 cubic yards of gravel will annually be placed downstream of Howard Hanson Dam. If research monitoring indicates that an increased rate of gravel nourishment would be beneficial, funds for additional gravel nourishment must come from non-Tacoma sources.

NGO 10-15

At this time, a formal description of Properly Functioning Conditions (PFC) has not been established for fish species to be covered by Tacoma Water's application for incidental take coverage. The function of natural riverine processes in the Green River watershed is discussed in HCP subsection 4.5.3, Current Processes Affecting Fish Habitat and Populations. Conservation measures described in Chapter 5 of the HCP were designed to contribute to restoring natural processes in view of existing and expected future conditions of the Green River basin (for example, continued flood control operations by the USACE at Howard Hanson Dam). The conservation measures are expected to contribute to restoring properly functioning conditions in the basin.

NGO 10-16

Tacoma Water has committed to several conservation measures associated with facilities operated by other parties (for example, USACE operation of Howard Hanson Dam). Tacoma Water has also committed to conservation measures where resource agencies and the Muckleshoot Indian Tribe have been provided the opportunity to identify and recommend adaptive management options with

the approval of the Services (for example, Howard Hanson Dam springtime storage and release operations). For conservation measures where agencies and the Muckleshoot Indian Tribe are responsible for adaptively managing a resource, Tacoma Water has committed to funding research to provide them with feedback on the results of their actions.

The research funding measure RFM-02A, Monitor Effect of Flow Management Strategies on Side Channel Habitats, is an example of a measure designed to provide the Green River Flow Management Committee with feedback on the results of its flow management recommendations.

NGO 10-17

Many of the research funding measures in HCP Chapter 6 (for example, RFM-02, A-E, Flow Management), provide the opportunity for testing of explicit assumptions and adaptively managing the resource in view of the results of experimentation. For instance, freshets are a short-term release of high flow designed to initiate movement and increase the survival of downstream migrating salmonid smolts. The release of freshets in the Green River, however, may allow adult steelhead to spawn along the channel margins at high flow levels where the eggs may be dewatered when the flow drops following the freshet. Research conducted under RFM 2-02 would allow the Green River Flow Management Committee to evaluate both beneficial and detrimental effects of freshets and to evaluate their use as a management tool to benefit Green River resources.

NGO 10-18

Tacoma Water has requested coverage under Section 10 of the ESA for the effects of its activities on Covered Species. These activities primarily involve management of approximately 10 percent of the Upper Green River Watershed and withdrawal of water at its Headworks facilities at RM 61.0. Howard Hanson Dam at RM 64.5 is a federal facility; project operations, including the storage and release of water and the interception of sediment and woody debris, are federal activities. Tacoma Water's conservation measures include the opportunity to restore anadromous fish runs above Howard Hanson Dam and the commitment to gravel nourishment and woody debris transport measures that would contribute to restoring natural ecosystem functions of the Green River.

NGO 10-19

The purpose of an HCP is to minimize and mitigate the impacts of any incidental taking authorized by a Section 10 permit, and to ensure that issuance of the permit does not appreciably reduce the likelihood of the survival and recovery of the species in the wild. An HCP is not required to recover listed species or restore habitat damaged by past actions, although many HCPs, including Tacoma Water's, include measures specifically designed to rehabilitate habitat that is not currently considered to be functioning properly.

NGO 10-20 and NGO 10-21

As the writer notes, many of the conservation measures in the HCP are reliant on successful implementation of the Additional Water Storage Project by the USACE. It is also noted that USACE has not completed its Section 7 consultations with NMFS and the USFWS. However, this consultation is nearing completion and the findings of the Biological Opinion by the Services regarding the Howard Hanson Dam Additional Water Storage Project are not in conflict with the proposals in Tacoma's HCP.

If the Additional Water Storage Project by the USACE did not go ahead, then Tacoma would still have the ability to independently implement some of the provisions of its HCP. However, it is more likely that this HCP would have to be developed to reflect a significantly scaled-down effort by Tacoma with regard to Green River water supply operations.

NGO 10-22

See General Comment Response 17 for a discussion of increasing instream flows to provide additional protection for fish, and General Comment Response 26 for a discussion of the adaptive management provisions of Tacoma Water's HCP.

See General Comment Response 30, which explains how the cumulative effects analysis of the DEIS was expanded to include the Additional Water Storage Project and Second Supply Project.

NGO 10-23

See changed circumstances text in the HCP, page 3-9.

NGO 10-24

The City of Tacoma will not own or operate the fish restoration facility and is not seeking ESA coverage for its construction and operation. As described in HCM 2-05, the transportation and release of juvenile salmonids from the fish restoration facility is contingent on regulatory approval of the facility and its intended uses, and obtaining the necessary water rights and permits for the facility. The Muckleshoot Indian Tribe will own and operate the facility; if necessary, permits to comply with the ESA may be issued to the Muckleshoot Indian Tribe and will be sought as a process separate from Tacoma Water's HCP. Operation of the fish restoration facility is not required to provide the opportunity to reestablish anadromous fish production in the upper watershed. If the fish restoration facility cannot be permitted or is deemed to be infeasible, the Muckleshoot Indian Tribe will use the available funds for fisheries enhancement in the Green/Duwamish River system.

NGO 10-25

If the Additional Water Storage Project at Howard Hanson Dam is not constructed, it is still possible that Tacoma would elect to fully implement the HCP as presented in this document. However, it seems more likely that the Second Supply Project would be significantly restructured in the absence of the Howard Hanson Dam Additional Water Storage Project resulting in the need to redevelop an HCP to address Tacoma's revised Green River program.

NGO 10-26

If the Second Diversion Water Right is not implemented, then it is doubtful that the HCP proposed at this time will be implemented. However, the need to address the requirements of ESA will most likely result in Tacoma developing an alternative strategy to ESA compliance other than this proposed HCP.

NGO 10-27

Contrary to the commenters' assertion, Tacoma Water's withdrawals under its First Diversion Water Right claim and Second Diversion Water Right will have little effect on high flows in the Green River. High flows in the Green River are controlled by the USACE's operation of Howard Hanson Dam for flood control, which is an activity separate from Tacoma's water withdrawals.

As noted in HCM 1-01 and HCM 1-02, Tacoma Water's HCP provides for reductions in water withdrawal during periods of low flow. These constraints reduce Tacoma's withdrawals from 213

cfs to an average annual withdrawal of approximately 180 cfs. Although Tacoma Water is proposing to withdraw up to 213 cfs on an instantaneous basis, Tacoma's average withdrawal of 180 cfs represents approximately 19 percent of the average flow of the Green River at Palmer and about 14 percent of the average daily flow of the Green River at Auburn.

The effects of Tacoma Water's withdrawals and conservation measures are described in HCP Chapter 7. The analyses in the HCP address the effects of both the First Diversion Water Right claim and the Second Diversion Water Right. Analyses of the effects of the First Diversion Water Right claim were developed separate from the effects of the Second Diversion Water Right under the No Action Alternative in the DEIS. In order for the Services to determine if the proposed conservation measures provide adequate resource protection, the Services requested that the HCP analyses evaluate the full effects of the proposed HCP action. The HCP analyses assume that water withdrawals are the maximum amount available under the HCP, even though full withdrawal may not occur for several years after the Second Supply Project is constructed.

NGO 10-28

The IFIM is a tool used in determining instream flow requirements and, as such, has inherent strengths and weaknesses. The Instream Flow Incremental Methodology remains the method generally used by Ecology and the WDFW (Washington Department of Ecology 1998), as well as the Services, to assess instream flow requirements. Ecology used the IFIM in its analyses of Green River instream flow requirements in 1989, and continues to use the method to assess instream flow requirements in other river basins in Washington State. In response to comments received during the scoping phase of the Additional Water Storage Project, Tacoma Water and the USACE conducted additional studies of juvenile salmon migration, side channel connectivity, and steelhead incubation in the Green River to supplement the IFIM study conducted by Ecology. Groundwater recharge is not expected to be affected by Tacoma's HCP since baseflow will be slightly increased during drought conditions and flood flows would not be affected by Tacoma's actions.

NGO 10-29

A discussion of shared risk between water supply and fisheries is provided in HCP Appendix E, Tacoma Water Response to Six Principles of Project Operation and Design for the Howard Hanson Dam Additional Water Storage Project.

NGO 10-30

See General Comment Response 27.

NGO 10-31

A description of the North Fork wellfields is provided in HCP subsection 4.2.3. Habitat Conservation Measure 1-01 (see HCP subsection 5.1.1) describes proposed resource protection measures and the effect of Tacoma's water withdrawals on aquatic resources in the North Fork Green River are described in HCP Chapter 7 under various upper watershed subheadings (for example, HCP subsection 7.1.3.1 Potential Effects of Covered Activities and Conservation Measures on Chinook Spawning and Incubation in the Upper Watershed).

NGO 10-32

See General Comment Response 28.

NGO 10-33

We have addressed concerns raised by the Center for Environmental Law and Policy in response to its comment letter (NGO 7). The Sierra Club commenter raises an additional specific concern regarding the apparent "lack of insects in the various sub-basins of the Green-Duwamish Watershed." We are unaware that any specific Green River sub-basin lacks insects and, therefore, we cannot respond in a more complete manner without additional information. If the Sierra Club has such information, we encourage the organization to provide it to the Services and Tacoma Water for review. During our evaluation of Tacoma Water's application for an ITP, we will evaluate both direct and indirect effects of the proposed actions on Covered Species.

NGO 10-34

Comment noted. Anadromous fish passage to the Green River upstream of RM 61 was blocked by the construction of the Tacoma Water Diversion Dam in 1911. Anadromous fish were not permitted in the watershed until October 1982, when the Muckleshoot Indian Tribe and Washington Department of Game began planting steelhead juveniles into the Upper Green River Watershed. In March 1983, the Washington Department of Fisheries began planting juvenile coho into the upper watershed, and in March, 1987, the Muckleshoot Indian Tribe began planting chinook juveniles in the upper watershed. Beginning in 1992, wild winter adult steelhead trapped at the Tacoma

Diversion Dam have been transported into the upper watershed and released into the Green River upstream of Howard Hanson Dam to spawn. The spawning and rearing success of these fish is unknown, but with implementation of the HCP, Tacoma Water would be dedicating considerable resources to monitoring the success of the adult salmon and steelhead reintroduction program. Operation of the downstream fish passage facility at Howard Hanson Dam is expected to greatly improve the survival of downstream migrating juvenile fish as well as kelt steelhead.

NGO 10-35

A discussion of existing downstream fish passage conditions at Howard Hanson Dam is provided as part of the supporting rationale for HCM 2-01, Howard Hanson Dam Downstream Fish Passage Facility (HCP subsection 5.2.1). As noted in that subsection:

> "Currently, juvenile salmon and steelhead migrating from the upper Green River to lower river rearing areas or migrating to salt water must pass through one of two HHD outlets (the flood control tunnel or a 48-inch-diameter bypass pipe). Two large radial gates regulate the flood control tunnel (1,035 feet) with a capacity of over 10,000 cfs. At flows less than 500 cfs, the 48-inch bypass pipe is used (1,069 feet). Refill of the project typically occurs between early April through June when the pool is filled from low pool (1,070 feet) to the full conservation pool (1,141 feet; plus 3 to 5 feet for debris removal). Spring refill coincides with the main outmigration period of juvenile salmonids. As the pool fills, the outlets are submerged to depths of 35 to 112 feet. As inflow to the reservoir recedes, outflow from the dam is routed to the bypass pipe (flows less than 500 cfs)."
>
> "Beginning in 1982, juvenile coho and chinook salmon and steelhead trout have been re-introduced into the upper watershed as a means to assess the ability of the existing configuration and operating plan of HHD to pass juvenile fish. Current annual survival of juvenile salmon and steelhead migrating through HHD outlets is estimated between 5 and 25 percent based on a fish passage model and on-site monitoring data (Dilley and Wunderlich 1992, 1993). The low survival rate is primarily a function of two factors: the spring refill of the reservoir submerging the dam outlets and the low survival of juveniles as they pass through the outlets. Juvenile fish require a near surface-outlet with a high discharge capacity outlet (exact volumes depend on site conditions). Therefore, at a time when fish need high flows and a shallow outlet, the project is reducing outflow (refill) and

creating a deeper outlet (from 35 to 112 feet deep). During outmigration fish may not find or be willing to use outlets that are deeply submerged. Fish that are delayed or entrapped beyond a certain time may not migrate to salt water and may not contribute to the returning adult population. Fish that sound (dive) to reach the outlet pipe experience high mortality from impacts at sharp bends or turns within the bypass. Direct mortality in the bypass pipe can range from 1 percent to 100 percent depending on the amount of flow, water temperature, pool elevation, and time of year."

"The new downstream fish passage facility is designed to provide much higher success of juvenile outmigration and to accommodate the higher water levels and changes in refill timing under the AWS project Phase I."

NGO 10-36

See General Comment Response 22 for a discussion of the performance of trap-and-haul fish passage facilities and the rationale for selecting a trap-and-haul program to restore adult anadromous fish access to the Upper Green River Watershed.

NGO 10-37

Tacoma Water has indicated it does not believe that reintroduction of anadromous fish to the upper watershed poses a risk to drinking water quality and public health at the numbers that have been discussed to date. This would include the introduction of up to 6,500 adult coho and 2,300 adult chinook. This level would be reached over a period of years allowing adequate opportunities to assess water quality on an ongoing basis. Tacoma Water has committed to monitoring the effects of fish passage on drinking water quality as part of its surface water treatment operations. If continued monitoring confirms that reintroduction of anadromous fish does not pose a risk to public health, no further action would be taken. If, to adequately protect drinking water quality, it becomes necessary to limit the biomass of adult fish transported into the upper watershed, Tacoma Water would coordinate with the NMFS, USFWS, and the fisheries managers before instituting measures to decrease fish passage. As part of the coordination effort, Tacoma would select one or more independent experts to evaluate available options. The independent expert would submit a report to the City, fisheries managers, and public health officials with recommendations as to the level of fish passage that can occur without posing a risk to drinking water quality and public health.

NGO 10-38

The 64 percent survival estimate for downstream fish passage through the Howard Hanson Dam Project was developed by the USACE during analysis of the Additional Water Storage Project (U.S. Army Corps of Engineers 1998). The passage estimate includes both reservoir and dam passage and applies only to subyearling chinook that move downstream during the early spring. Juvenile salmonids that move downstream at larger sizes, such as yearling coho and steelhead and chinook salmon, are expected to pass downstream with higher survival rates. Assuming a 64 percent rate of passage survival, chinook salmon have a fair to poor chance of establishing self-sustaining runs above Howard Hanson Dam (U.S. Army Corps of Engineers 1998).

The primary source of injury is assumed to be associated with downstream passage through the Howard Hanson Reservoir. Although some juvenile chinook populations successfully pass downstream through large waterbodies (for example, Lake Washington), chinook populations on other river systems appear unable to develop self-sustaining runs due to losses during reservoir passage. Juvenile salmonids passing downstream through Howard Hanson Reservoir may experience higher survival rates than modeled due to the lack of large predator populations. However, if juvenile chinook survival rates are much lower than 64 percent, it is unlikely that self-sustaining, naturally reproducing runs will be established in the Upper Green River Watershed.

Once the juvenile salmonids enter the forebay area of the Howard Hanson Reservoir, the proposed downstream fish passage facility is expected to successfully pass the fish downstream of Howard Hanson Dam.

NGO 10-39

See Specific Comment Response NGO 10-38.

NGO 10-40

The commenter suggests that Tacoma attempts to separate the Additional Water Storage Project from the HCP. This is simply a recognition of the areas where Tacoma has the ability to exert control and has responsibility versus the areas where control and responsibility rest with USACE. Tacoma and USACE have coordinated extensively on the linkage between Tacoma's Second Supply Project and the Additional Water Storage Project at Howard Hanson Dam. The Additional Water

Storage Project is currently completing review of a biological assessment by the USFWS and the NMFS. The resultant Biological Opinion will provide the public a sound assessment regarding the effectiveness of project implementation. In the event that the Additional Water Storage Project was not to go ahead, Tacoma's HCP would require extensive modifications.

See General Comment Response 30, which explains how the cumulative effects analysis of the DEIS was expanded to include the Additional Water Storage Project and Second Supply Project.

NGO 10-41

See Specific Comment Response NGO 10-24, and General Comment Response 30.

NGO 10-42

See Specific Comment Response NGO 10-24.

NGO 10-43

In the event that the proposed HCP cannot be approved by the Services, then Tacoma would need to reconsider its future plans for expanded water supply from the Green River. In the event that no further diversions from the Green River were possible, the commenter is correct that Tacoma could still seek an ITP to cover its existing operations on the Green River. However, this was not considered to be a viable alternative to the proposed HCP because it did not meet the purposes of the proposed HCP and associated projects, i.e., the regional supply of water in Tacoma, South King County, and the Seattle service area.

NGO 10-44

The commenter is correct that page 9-2 line 38 overstates Tacoma's reliance on the Second Diversion Water Right. It should indicate that this project or other projects, some of smaller size, will need to begin to come on line shortly after 2001. Tacoma does have the ability to develop numerous small sources of supply. These small sources are an integral part of water supply programs in conjunction with the Second Diversion Water Right on the Green River.

Tacoma currently has and continues to develop contracts with adjoining water purveyors for the delivery of water. As the largest water supplier in Pierce County, Tacoma has the ability to support

adjoining utilities and has provided service outside of the City limits of Tacoma for many years. This provision of water is at a rate 20 percent higher than inside City rates, which reflects the additional cost to provide service outside of the City limits as well as the cost of City support services which Tacoma ratepayers pay through taxes. Tacoma maintains that the sale of water outside the City limits and on a wholesale basis is not a money-making venture but an extension of a public service.

NGO 10-45

The storage of additional water for fisheries purposes under Section 1135 of the Clean Water Act at Howard Hanson Dam is a project sponsored by the City of Tacoma, as is the Additional Water Storage Project at Howard Hanson Dam. The quality of fish passage and environmental resource protection and restoration included in both of these projects as a result of local sponsor participation may not be maintained without this local financial involvement. In its cooperative efforts with local governments and other water utilities to meet water supply needs in the Central Puget Sound area, Tacoma seeks to meet a public need for additional water supply as identified by growth projections for the Central Puget Sound area under the State's Growth Management Act. Tacoma is the major water supplier in Pierce County and South King County and thus better able to serve in a leadership and coordinating role than smaller utilities in the region.

NGO 10-46

We are unable to provide a specific response to this comment since we are unsure of the substantive concern. However, please refer to Specific Comment Responses NGO 7-17 and NGO 7-18 for a response to the Center for Environmental Law and Policy concern regarding the range and scope of alternatives.

NGO 10-47

In the proposed HCP, Tacoma has presented the best plan that it believes is possible given the limitations on resources under which it operates. If the Services determine that this HCP cannot be issued then it may be necessary for Tacoma to revise its plans on the Green River and to simply seek to revise the HCP to protect its existing first diversion water right operation.

NGO 10-48

The alternatives in the HCP and the NEPA review are often different in scope because these analyses are aimed at different objectives. Under the HCP, the Applicant must analyze possible alternatives to *implementation of an HCP*, including other planning options aimed at take avoidance. However, under NEPA, the Services must analyze alternatives to the proposed agency action, which is *issuance of an ITP*, including no permit issuance, or issuance of other permits that would meet the Applicant's proposed purpose and need.

While it is true that the USACE has the authority to store water for fish, this federal storage "action" does not alleviate Tacoma Water's requirement to comply with the ESA while withdrawing water. It is important to note that storage and withdrawal are two separate actions performed by a federal agency governed under Section 7 of the ESA and private entity (Tacoma Water) governed under Section 10 of the ESA, respectively. The USACE approval to store water does not extend so far as to allow Tacoma Water to potentially harm fish resources through its independent water withdrawal actions. Consequently, it was necessary for Tacoma to embark on a Section 10 compliance independent of the USACE's actions.

We are unsure of the specific concerns related to the adequacy of the alternatives review and the range of alternatives. However, please refer to Specific Comment Response NGO 7-17 for further information.

NGO 10-49

See General Comment Response 4 and DEIS subsection 2.3. Tacoma Water has made application to the USFWS and NMFS for two ITPs, one from each agency. The Services' Proposed Action, therefore, is issuance of ITPs. The purpose and need of the Proposed Action as stated in subsection 1.2 of the DEIS is to respond to Tacoma Water's permit application in a manner that: 1) provides protection and conservation to listed and proposed species and their habitats to the extent intended under §10(a)(1)(b) of the Act; and; 2) allows Tacoma Water to fulfill its water supply obligations in a practical manner. The environmental review process must focus on this Proposed Action, the stated purpose and need for the action, and alternatives to the Proposed Action that will fulfill the purpose and need. Alternatives, such as water conservation and reuse alone, would not fulfill the purpose and need to supply the Tacoma Water service area, and are beyond the scope of this DEIS and need not be analyzed.

It should be noted that Tacoma does have an aggressive water conservation program, which, as described in subsection 2.2.1.1, has resulted in water savings of nearly 18 million gallons per day since 1990. While water conservation and reuse would not result in adequate water supplies for the Tacoma Service Area, these programs are integral components of each water withdrawal alternative. Furthermore, if an ITP is not issued to Tacoma Water, this water conservation program would continue to be implemented.

Tacoma and the Services do recognize the public interest surrounding the selection of a source of additional water in response to growing demands. It is for this reason that additional information was included in subsections 2.2.1 and 2.3 of the DEIS regarding the decision-making process that Tacoma Water went through in determining its management direction for obtaining additional water, and prior to initiating discussions with the Services regarding ITPs. This information was included so that the public would understand the rationale and considerations involved in the local decision-making process that led to Tacoma's request for an ITP.

NGO 10-50

See General Comment Response 22 for a discussion of the performance of trap-and-haul fish passage facilities and the rationale for selecting a trap-and-haul program to restore adult anadromous fish access to the Upper Green River Watershed.

NGO 10-51

Refer to Specific Comment Responses prepared for the Pacific Crest Biodiversity Project letter, NGO 8.

NGO 10-52

Comment noted.

NGO 10-53

Comment noted. Although Tacoma Water controls access into the closed portion of the Upper Green River Watershed, it owns only 10 percent of the land in the upper watershed. Agreements with the other landowners allow Tacoma Water staff to monitor activities that have the potential to degrade water quality, such as road building and logging. Tacoma Water has been able to meet federal and

state municipal water quality requirements for unfiltered surface water supplies in large part because of its watershed access control policies. Public access is available to the upper watershed from 2 miles east of the former townsite of Lester at Friday Creek gate east to the crest of the Cascade Mountains. Lands included in this part of the watershed belong to the USFS, DNR, Plum Creek Timber Company, and the City of Tacoma, although no camping is allowed within 200 feet of the Green River or any perennial stream.

NGO 10-54

See Specific Comment Response NGO 10-53. There is access to the trails the commenter mentions from the south, on USFS roads that are open to public access.

NGO 10-55

Comment noted. Refer to subsections 3.10 (Recreation) and 3.11 (Visual Resources) for a baseline description; 4.2.8 (Recreation) and 4.2.9 (Visual Resources) for an analysis of the impacts from water withdrawal; and 4.3.8 (Recreation) and 4.3.9 for an analysis of the impacts from upper watershed management. Also see General Comment Responses 13, 17, 19, and 21.

NGO 10-56

Comment noted. See Specific Comment Response NGO 10-55.

NGO 10-57

Comment noted. See Specific Comment Response NGO 10-55.

NGO 10-58

See General Comment Response 3.

NGO 10-59

See Specific Comment Response NGO 10-55.

NGO 10-60

See Specific Comment Response NGO 10-55.

NGO 10-61

See Specific Comment Response NGO 10-55.

NGO 10-62

Comment noted.

NGO 10-63

See General Comment Response 21.

NGO 10-64

The establishment of water rates is the responsibility of the local government's operating water utilities. Tacoma's water rate structure currently includes an inclining block rate structure and a summer surcharge to increase the rates during high demand periods. Tacoma has indicated that while some additional savings of water might be provided through raising rates to higher levels at the upper ends of water use, it is doubtful that the 40 percent savings indicated could be attained. In addition, a large percentage of water utility customers do not support raising water rates above the cost of service.

NGO 10-65

See General Comment Response 19.

NGO 10-66

The information in Chapter 8 is provided to comply with ESA Section 10(a)(2)(B)(iii), which requires that an Applicant for an ITP "ensure that adequate funding for the plan (HCP) will be provided." Only by identifying the costs of the mitigation measures can Tacoma Water demonstrate that adequate funding will exist to carry out those measures. The relationship between the costs of mitigation and the revenues to be generated under the ITP is only relevant in demonstrating that sufficient funding will be available to implement the HCP. The Services do not have the regulatory authority to determine how much revenue Tacoma Water will generate from the sale of water and/or timber under the ITP.

NGO 10-67

See Specific Comment Response 10-66. Note also that the majority of the cost of the upstream fish passage conservation measure is associated with passing fish above the USACE's 238-foot high Howard Hanson Dam.

NGO 10-68

See Specific Comment Response 10-66. Note also that Tacoma Water is contributing funding to a variety of conservation measures, including downstream fish passage at Howard Hanson Dam and gravel nourishment as described in HCP Table 8-1, Estimated Costs of habitat conservation measures identified in Tacoma's Green River Habitat Conservation Plan. The joint funding estimate described in HCP Table 8-1 represents a cost-share arrangement between Tacoma, the USACE, and other potential partners

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NGO 10-69

The estimated costs for wildlife and riparian habitat conservation measures stated in HCP Table 8-1 are accurate, although they may require some explanation. The costs of HCM 3-01 include opportunity costs associated with leaving merchantable timber standing in reserves; opportunity costs of extending rotations outside reserves; creating snags; slash disposal; reforestation; and management costs associated with delineating, working around, and monitoring special management areas. The estimate of $2,129,000 is accurate.

Estimated costs for the upland forest management measures described above are primarily the lost value resulting from leaving merchantable timber in riparian buffers (HCMs 3-01, 3-02, 3-03, 3-04). They include the value of unharvestable timber in riparian areas to comply with current Forest Practices Rules, as well as the cost of unharvestable timber in riparian areas to comply with the requirements of the HCP. The HCP requirements are considerably greater than current Forest Practices Rules, and would result in the retention of at least double the timber volume. A conservative estimate of the costs attributable to complying with HCM 3-02 alone would be $1,500,000 (as opposed to the $3,000,000 shown in Table 8-1, which includes the value associated with foregoing timber harvest to comply with both the Forest Practices Rules and HCM 3-02).

Road construction and maintenance measures (HCM 3-03) in the HCP stem from Watershed Analyses prescriptions, but inclusion of those prescriptions as commitments in the HCP represents an increased financial liability for Tacoma Water. Therefore it is understandable and acceptable to include all such costs ($1,714,000) in the analysis of the HCP.

The costs of species-specific management measures (HCM 3-04) are also largely opportunity costs associated with leaving timber standing in buffers, and are based on assumptions as to how many buffers could be required. The estimate of $741,000 could be low if all the Covered Species were encountered in the watershed and the maximum number of buffers allowed for in the HCP were required.

With removal of the value of unharvested timber in riparian buffers attributable to current forest practices, the total estimate for all management measures (HCM 3) would be $6,084,000. Given that the purpose for presenting cost estimates in the HCP is to ensure adequate funding for the conservation measures (see Specific Comment Response NGO 10-66), it is appropriate to include all possible costs in the estimate.

NGO 10-70

The decision to collect 50 percent of the costs of storage, source, transmission, and treatment in Tacoma's System Development Charge was made by Tacoma's Public Utility Board and City Council. It is a reflection of a City policy that recognizes that new customers should pay a significant portion of new water supply but that there is also an obligation for existing customers to pay for a portion of those costs.

NGO 10-71

See Specific Comment Response NGO 9-11.

NGO 10-72

Tacoma must pay the cost of the HCP by whatever resources are available. The Services must reach a finding that adequate funding is available to implement the HCP measures, but the Services cannot direct an Applicant where to obtain the funding.

NGO 10-73

See Specific Comment Response NGO 10-64.

NGO 10-74

Comment noted.

NGO 10-75

Contrary to the commenter's assertion, an estimate of the expected use of the North Fork Wellfield is provided in HCP subsection 4.2.3, Table 4-6, Summary of Average Daily Flow In The North Fork Green River And Expected Well Demand From The North Fork Wellfield By Month.

NGO 10-76

A description of the North Fork wellfields is provided in HCP subsection 4.2.3. Habitat Conservation Measure 1-01 (see HCP subsection 5.1.1) describes proposed resource protection measures and the effect of Tacoma's water withdrawals on aquatic resources in the North Fork Green River as described in HCP Chapter 7 under various upper watershed subheadings (for example, HCP subsection 7.1.3.1 Potential Effects of Covered Activities and Conservation Measures on Chinook Spawning and Incubation in the Upper Watershed).

NGO 10-77

Water withdrawn by Tacoma Water from the North Fork Wellfield represents an exercise of Tacoma's First Diversion Water Right claim. As such, Tacoma logically addressed any constraints on use of the North Fork Wellfield under HCM 1-01, Minimum Instream Flows Under First Diversion Water Right. The degree of protection afforded by conservation measures would not be affected by whether proposed actions are addressed in individual conservation measures or grouped into categories.

NGO 10-78

The potential risks of channel dewatering associated with withdrawals from the North Fork Wellfield are acknowledged in the supporting rationale for HCM 1-01 (see HCP subsection 5.1.1). An assessment of the degree of risk to aquatic resources and anticipated effectiveness of the proposed conservation will be evaluated during the Services' deliberations on issuing Tacoma Water an ITP.

NGO 10-79

Use of the South Tacoma wellfield during periods of withdrawals from the North Fork Wellfield was considered during development of the conservation measure and is specifically addressed in HCM 1-01.

NGO 10-80

Tacoma has indicated it is currently unaware of any alternative groundwater source that could be brought to bear in lieu of the North Fork Wellfield.

NGO 10-81

Tacoma's operation as an unfiltered water supply is an important means of cost control for Tacoma's water utility. If filtration is required in the future, it may be possible to meet the requirement though the use of a membrane filtration system. Currently, the technology of membrane filters is developing rapidly, and Tacoma hopes to utilize this technology at some point in the future if filtration is required. However, membrane technology has not yet developed to the point where a plant of adequate capacity to meet Tacoma's needs has been built. The decision to delay filtration is in keeping with Tacoma's obligation to minimize the costs charged to ratepayers for water supply.

NGO 10-82

It does not appear that forest practice is the only or even primary source of turbidity in the Green River system. In recent years, Seattle has experienced turbidity difficulties of tremendous impact despite the very limited logging that occurs in the Cedar River Watershed. See General Comment Response 10 for additional information.

NGO 10-83

See Specific Comment Response 10-38.

NGO 10-84

As explicitly noted in HCM 2-05, the transport and release of juvenile salmonids above Howard Hanson Dam is contingent on approval by the Services:

> "If supplementation of juvenile salmonids into the Upper Green River Watershed is determined to be beneficial to Green River fish runs by the NMFS and USFWS, Tacoma will transport and release juvenile salmonids above Howard Hanson Dam" (*emphasis added*).

The Services believe this contingency is a critical component of the proposed conservation measure for the reasons stated by the commenter.

NGO 10-85

There are three reasons why the discussions of wildlife in the HCP and DEIS are not as extensive as the corresponding discussions of fish. First, most of the Covered Wildlife Species are rare on the Covered Lands, whereas Covered Fish Species are known to occur in the Green River. The Covered Wildlife Species are generally rare because the Green River watershed is at or beyond the limit of each species' geographic range, and/or because past land management practices throughout the watershed have displaced the species from the area.

Second, the impacts of Tacoma Water's activities on the Covered Wildlife Species are expected to be minimal, while the potential for Tacoma Water to impact Covered Fish Species is considerably greater. The withdrawal of water has little or no impact on the Covered Wildlife Species, and the low rate of timber harvesting proposed by Tacoma is anticipated to result in a low potential for incidental take.

Lastly, the wildlife habitat conservation measures included in the HCP are extremely conservative in favor of protecting the Covered Species. Roughly 74 percent of the Covered Lands would be dedicated to habitat reserves in the Natural and Conservation Zones, and a sizable portion of the remaining 26 percent would be dedicated to riparian buffers, upland management areas, and leave-tree patches.

Also, see General Comment Response 28 for a discussion on the use of best available science by the Services when making permit decisions.

NGO 10-86 and 10-87

See Specific Comment Response NGO 8-2. The commenter asserts that the DEIS fails to analyze the direct, indirect, and cumulative effects to ESA listed and non-listed fish stocks throughout the Green-Duwamish Watershed. The Services believe that the effects to fish stocks have been

addressed. Table 4-1 in the DEIS shows the activities that are anticipated to result in effects to the human environment in a different quantity, or a different manner under each of the action alternatives, as compared to the No Action Alternative. The DEIS presents a comparative analysis of these direct and indirect effects in subsections 4.2 and 4.3. Subsection 4.4 presents a comparative analysis of the cumulative effects of the Proposed Action. See General Comment Response 3.

NGO 10-88 and 10-89

See General Comment Response 30 and Specific Comment Response NGO 8-2. The DEIS analyzed cumulative impacts under various land use categories within the Green River Watershed, and within the region such as agricultural and forest uses. The cumulative assessment assumed that the land- and water-related conditions described by the commenter (e.g., water quality conditions, fish passage barriers, availability of habitat restoration sites) were part of the existing environment (i.e., the baseline condition of the upper, middle, and lower watershed). This baseline condition was analyzed in Section 4.0, Environmental Effects. Mitigation was designed in light of these known land use and instream conditions to meet the objectives of the ESA.

NGO 10-90

See General Comment Responses 15, 16, and 30.

Comment Responses to The Mountaineers (NGO 11)

NGO 11-1
Comment noted.

NGO 11-2
Comment noted.

NGO 11-3
See General Comment Response 11 concerning the impacts of the forest management on riparian areas, salmonid habitat, and water quality.

NGO 11-4
Comment noted.

NGO 11-5
Comment noted.

NGO 11-6
See General Comment Responses 5 and 7.

NGO 11-7
Tacoma uses a variety of funding sources for watershed land acquisition, including timber sales and the water quality fund.

NGO 11-8
See General Comment Response 7.

NGO 11-9 through NGO 11-12

See General Comment Response 27 for a discussion of the instream flows and natural flow variation; see General Comment Response 17 for a discussion of increasing instream flows to provide additional resource protection.

NGO 11-13

Comment noted.

NGO 11-14

Comment noted.

NGO 11-15

See General Comment Response 21.

NGO 11-16

See General Comment Responses 18 and 19.

NGO 11-17

See General Comment Response 19 and Specific Comment Response TRI 2-49.

NGO 11-18

See General Comment Response 12. Raising the Howard Hanson Reservoir level would not require the removal of any elk. Elk would be displaced from foraging in areas inundated by the raised water level, but alternate foraging areas will be provided in permanently managed shrub and brush plots and in early seral stands in the Commercial Zone. These areas would be readily accessible to the displaced elk. There would be no need to physically move any of the elk.

NGO 11-19

Comment noted. This is proposed in HCM 2-03 and is part of the USACE Additional Water Storage Project. By planting inundation-tolerant vegetation adjacent to areas inundated by Howard Hanson Reservoir and along lower reaches of tributaries flowing into the reservoir, denuded shorelines would be re-vegetated with more water-tolerant plant communities for both fish and wildlife habitat

and will lessen erosion from wave action. The HCP does not suggest which plant species would be used, only that they should be tolerant to inundation. The recommended plant species to be used would be determined during the USACE's final design of the Additional Water Storage Project with agreement by WDFW and Tacoma Water. Plant species native to western Washington are preferred.

NGO 11-20

Comment noted.

State of Washington
DEPARTMENT OF FISH AND WILDLIFE

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March 29, 2000

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Dear Gentlemen:

Below are the Washington Department of Fish and Wildlife's comments on the City of Tacoma Water Department Habitat Conservation Plan. Our comments are separated into those pertaining to fish and water resources, and those pertaining to terrestrial wildlife. In addition, we have provided general comments as well as specific comments referenced to specific sections of the document.

If you have questions, please feel free to contact Mark Hunter (902-2542) or Gary Engman (425/775-1311, ext 122) for issues related to fish and water, or Steve Desimone (902-2507) for wildlife questions. You can also contact me at 902-2847.

Thank you.

Sincerely,

David Whipple
Forest Habitats Section Manager

AQUATIC RESOURCES

General Comments

1 Tacoma proposes several habitat enhancement projects for the new inundation zone to will result from raising the dam, and increasing water storage. The loss of habitat is poorly documented.
2 There is no map showing the old and new inundation zones, and text is less than sincere about this loss. The lengths of channel inundated is uncertain although one note states it is
3 approximately two additional miles of the mainstem and NF Green River (p. 5-51 line 30) and an additional note refers to one mile of smaller tributaries (p. 5-52 line 18). Three miles is a significant loss. It is also implied that the inundated channels can still be counted as fish habitat
4 when appropriate restoration activity is performed. There is no basis for claiming that this fish habitat is salvageable.

Timber harvest and forestland recreation are claimed to be the only human activity in the upper watershed. Looking at the map, this is not entirely clear. The upper mainstem of the Green River
5 and Sunday Creek is major transportation and utility corridor that connects with Eastern Washington over Stampede Pass. There is a railroad, several major powerlines, and main haul road, and often a second forest road all located in the floodplain and riparian zone. This extends for the 10 miles of the Green River and an additional 5 miles of Sunday Creek.

The mainstem of the Green River is crucial part of anadromous restoration. Is the river impacted
6 by the loss of shade from a railroad that appears to be on the south bank for nearly five miles?
7 Can LWD recruit naturally from both banks? Does the river have enough room to meander,
8 recruit trees, create side channels, etc? Can juvenile coho access wall base springs and find
9 shelter from winter torrents? **The information to make this assessment isn't here.** Proposed
10 channel rehabilitation plans may be over-focused on in-channel placement of LWD and boulders, and not enough on restoring the floodplain.

Between the transportation corridor and inundation, it may be that the areas with the best fish
11 habitat potential have been partially, or substantially lost. There is not sufficient information in this document to determine otherwise.

A Note on Watershed Analysis. Some of the Forestry related habitat conservation measures are dependant on Watershed Analysis to determine the appropriate action, or for adaptive
12 management assessment. Watershed Analysis is a regulatory process implemented by the Washington State Dept. Of Natural Resources (DNR). The mass wasting and surface erosion modules have been replaced by standard rules that dictate watershed scale, or ownership scale assessments and prescriptions.

13 For this reason, any habitat conservation measure dependent on the outcome of watershed analysis should state 'or the contemporary forest practices, if WA is no longer available'.

14 Likewise, any adaptive management measure that depends on the five year watershed analysis review should clearly state that "Tacoma will initiate and complete equivalent five year reviews for their ownership, if DNR fails or ceases to conduct Watershed Analysis Reviews."

15 With respect to Green River fisheries resources, there are several overriding issues in regard to the adequacy of the proposed plan to accomplish its mission to minimize and mitigate the proposed taking.

1. Habitat conservation measures regarding instream flows overstate resource protection and mitigation measures that will actually be provided under the proposed project utilizing additional storage at Howard Hanson Dam;

16 2. Impact analyses based on the stated instream flow habitat conservation measures may not be valid. Described impacts must reflect what will actually occur under terms and conditions of the proposed project;

17 3. Minimum flows to be provided will not, by themselves, provide the level of protection promised in the Habitat Conservation Plan.

18 To mitigate effects of current and future operation of the Tacoma Public Utilities (TPU) water supply facilities on the Green River, great reliance is placed on the 1995 agreement between the Muckleshoot Indian Tribe (MIT) and the City of Tacoma regarding instream flows and other matters. This agreement accomplished important enhancements and expansions of instream flow minimum requirements for the Green River including application of requirements to Tacoma's first diversion water right claim (FDWRC) as well as the as yet unconstructed second diversion project. However, the future mode of operation for municipal water supply diversion from the Green River, and the vast majority of the prospective 50 year term of the HCP, incorporates use of additional storage at Howard Hanson Dam (HHD). As proposed, along with existing summer conservation pool storage requirements, water would also be stored in the spring for municipal use in summer and fall. As we understand from recent direct communication with TPU, it is their belief that none of the MIT/TPU instream flow provisions relating to the second diversion water right (SDWR) apply when water is being diverted from storage behind HHD, which will be the primary mode of operation every summer. This means that **during the critical summer low-flow period, most of the more important provisions of the MIT/TPU flow agreement do not apply and will not be implemented.** In other words, the MIT/TPU is fully in effect only when the TPU second diversion is not operating from storage in HHD.

19

20 We could not find where this fact is clearly communicated anywhere in the Habitat Conservation Plan (HCP) or the accompanying Draft Environmental Impact Statement (DEIS). Discussions throughout the HCP and DEIS clearly imply that all instream flow provisions of the MIT/TPU agreement apply all the time. Habitat Conservation Measure HCM 1-02 clearly states the

21

seasonal restrictions and minimum flow requirements on the second diversion water right at Palmer and Auburn and further specifies:

> *"These instream flow conditions are in addition to those specified under HCM 1-01 and specify the flow conditions under which SDWR water can be diverted into P5. Both instream flow conditions must be met before SDWR can be diverted. Thus, if instream flows at Auburn fall below 400 cfs, even if minimum flows for the Palmer gage are achieved, Tacoma may not withdraw water using its SDWR. To the extent that these instream flow requirements are greater than the instream flows prescribed by Ecology (e.g., July through October), these flow requirements will control the diversion action."*

21

It is TPU's belief that these clearly stated restrictions and conditions on the operation of the SDWR do not apply when water is being withdrawn from storage, the intended mode of operation during the critical summer-early fall low flow season. In this situation, the only applicable restriction and instream flow condition on the diversion of water from the Green River is outlined in HCM 1-01 and applies only to the existing first diversion water right claim. This a considerably different situation and offers much less protection for Green River fisheries resources than is clearly stated in HCM 1-02 and causes us to question the validity of impact analyses throughout the HCP and DEIS.

22

Additionally, minimum flow requirements are not a complete solution because they are often a major compromise and blind to the realities of real-time conditions and needs. We do not mean to diminish the importance of the MFF/TPU agreement. To the extent that its provisions are in force and effect, it would provide significant new protection that did not previously exist. But, even if fully implemented, which unfortunately does not appear to be the case here, it would be an incomplete solution. Two clear examples are steelhead and chinook.

23

Because Green River flows in spring are almost always well above specified minimums, steelhead are forced to deposit their eggs in locations that are not protected by typical late June-July flow levels. Consequently, to avoid stranding and considerable loss of pre-emergent steelhead fry, flow augmentation is necessary. Flows during chinook spawning are often so low that chinook are crowded into confined locations along the thalweg, frequently with their backs out of the water. Such crowding leads to spawners digging up previously deposited eggs and forcing fish to spawn along the center of the stream channel risks further loss of eggs and alevins to streambed scour. The proposed project includes 5,000 acre-feet of storage to help mitigate these problems. Unfortunately, it is not enough to solve either much less both problems. The future of Green River fisheries resources, therefore, will depend heavily on Tacoma's willingness and ability to voluntarily meet actual resource needs not provided for in the habitat conservation plan as proposed. However, it is our understanding that the U. S. Fish and Wildlife and National Marine Fisheries services do not wish to incorporate or rely on mitigative elements within Habitat Conservation Plans that are not "hard wired" or certain. But when the explicit measures

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24 that are relied on in this plan will not accomplish the plan's stated purposes and objectives, what alternative is left? Additional measures are necessary as were envisioned by the six principles outlined in our's and National Marine Fisheries Services' conditional letters of endorsement of the Howard Hanson Dam Additional Storage Project (see HCP Appendix E.).

25 As we have previously commented on working drafts of this HCP dating back to late 1998, there was, and still is, a large gap in critical decision-making and operational processes between this HCP and the parallel Section 7 process intended to cover Corps of Engineer's roles in the implementation of the proposed project. There continues to be a very confusing situation as to division of authority and responsibility for crucial management actions that are fundamental to achieving necessary resource protection. It is still impossible to determine whether, or by whom, essential factors will be addressed. Issuance of the prospective Incidental Take Permit must be based on a clear and complete delineation of authority and responsibility for all aspects of this project. Unfortunately, this still does not exist.

26 Based on the above considerations, we have serious reservations as to whether the proposed HCP will support a finding that the preferred project and impacts of the proposed taking are adequately mitigated or that the proposed take will not appreciably reduce the likelihood of the survival and recovery of Green River fisheries resources.

Specific Comments

27 Section 2.3.3.2 starting page 2-11. Considerable discussion about the potential resource benefits of raising the dam, but no where in this document are there details on the environmental or fish habitat costs of raising the dam. The report should clearly spell out how many miles of stream channel is currently inundated, and how many miles of additional miles of stream channel will be inundated by raising the dam. Furthermore, there should be some discussion of the quality of stream habitat lost.

28 Section 2.3.3.2., Additional Water Storage Project, p 2-12. Discussion of agency and tribal "approval" does not mention that approval was dependant on certain critical conditions, none of which are mentioned or discussed. Specific conditions were outlined by both the Washington Department of Fish and Wildlife and National Marine Fisheries Service.

29 Page 2-12 to 2-14. A balanced discussion should include a bullet list habitat costs associated with the proposal, i.e., lengths of stream channels inundated, acres of forest, meadows and wetlands inundated, potential effects of reservoir shoreline erosion and other issues. If there is specific mitigation for these impacts, they may also be mentioned.

30 Page 2-13 Line 32-33. Maintenance of instream and riparian corridor habitat within the proposed additional inundation zone. This habitat is a total loss, and this proposed mitigation

will not be effective.

31 Section 4.5.3.4, Droughts, p 4-83, lines 10-20. Current low flow patterns, with FDWRC, are worse than historical despite low flow augmentation by HHD. Provisions of this HCP as well as those proposed under the AWSP will not change or mitigate this problem and its consequential detrimental effects on Green River fisheries resources.

32 Section 5.1.1, Habitat Conservation Measure, HCM 1-01, p 5-13. This measure reflects provisions of MIT/TPU agreement for minimum flows under the FDWRC as well as articulating constraints on the operation of the North Fork well field. These are clearly valuable provisions that provide much needed **minimum** protections. However, significantly greater flows are needed to provide favorable conditions for chinook spawning that are conducive to actual wild stock recovery. Based on observations as recently as fall of 1999, flows that under this provision would occur under "Wet to Average Years" i.e., 300 cfs, resulted in observable crowding of spawning chinook salmon on very specific locations. Many fish were trying to spawn with their backs out of the water. Successive waves of fish were forced into these same locations, very likely digging up eggs of earlier spawners . Auburn minimum flows under HCM 1-01 range up to only 350 cfs in wet years and down to 250 to 225 cfs in dry years. This is a clear example of where provision is needed for real adaptive management, to meet actual resource needs as and when they occur. Attempts to augment these flows in 1999, from storage in HHD, failed.

33 Additionally, how will HCM 1-01 minimum flows be achieved? During the summer- fall season, HHD is operated to provide a target minimum flow of 110 cfs at Palmer. Will additional flow augmentation from HHD be necessary, perhaps exhausting available storage prematurely with consequential resource impacts, or will the first diversion be throttled back?

34 Section 5.1.2, HCM 1-02. Discussions regarding the benefits to be expected through implementation of MIT/TPU agreement minimum flow provisions relating to SDWR, fail to mention that **TPU will not provide these flows** when SDWR is being diverted from storage, the intended mode of operation, in the critical low-flow summer season.

35 Page 5-21 to 5-24. HCM 1-03 (Installation of trap and haul at the water intake facility) and HCM 1-04 (install screening on water intake). It would be important that Tacoma commit to returning LWD to the middle river by stating " All woody debris collecting on the intake screens and trap and haul equipment will be deposited in the channel below the headworks". The 3.5 miles of channel between the headworks and the dam can be a good source of wood. The canyon type channel assumes recruitment of wood from windthrow and natural landslides. The headworks intake screen and upstream fish passage facilities may need design modifications facilitate wood delivery downstream.

35 Page 5-25. HCM 1-05 (Headworks LWD placement) "LWD will be ...[conifer]...greater than 20 feet long, with a minimum stem diameter of 12 inches. Rootwads will have at least 3 feet of attached stem than is 18 inches in diameter." These sizes are very small for a channel of this width and hydraulic power. Key Piece LWD sizes, which are minimum sizes necessary to provide long term stability and function, would probably be in the order of 26"-30" inches diameter and a length of twice bankful width for a river of this size(see WFPB 1996, ODF and ODFW 1994, Cederholm, Dominguez and Bumstead 1998, WFPB 2000, p. 5-26 line 18-23 of this document). Key Piece rootwads should have a length of at least 1.5 times BFW.

36 Although the wood is anchored (this is necessary since it is in the proposed inundation zone of the headworks), it still may not last long. Given the energy of the water coming through a canyon, abrasion with anchoring cables and boulders might abrade through small LWD rather quickly. Finally, to make a significant impact on fish habitat, wood really needs to be scaled to the size of the channel. Twelve inch diameter wood is probably falling into the river all the time, and it gets broken-up and carried downstream almost as fast as it recruits. These sizes are not going to make a significant impact. It would make more sense to place fewer very large pieces, such that they will capture smaller pieces floating down the river.

37 Page 5-25. HCM 1-05. "*Tacoma will also fund one complete replacement within the term of the HCP should deterioration of the materials or flood damage make such an action necessary.*" We would expect 12 inch wood to last far less than 25 years, which appers to be the design expectation in this project (i.e., two placements during a 50 year HCP). Placing wood and boulders in large, high energy channels is quite experimental, especially at the sizes proposed.

38 Section 5.2.1, HCM 2-01, p 5-28. Regarding the Howard Hanson Dam downstream fish passage facility, reference is made to a "single lock facility ". It is our understanding that the decision between a single or dual lock outlet structure has not yet been formally determined and awaits further development of design criteria and evaluation.

39 Section 5.2.2, Potential HHD Operational Strategy: Dedicated and Non-Dedicated Storage, p 5-38. In order to accomplish all project water storage objectives, rate of water storage may have to be accelerated in early spring. But this will not avoid at least a significant portion of chinook outmigration which could be well underway in January and very significant in February and March. An early refill strategy will likely favor steelhead and coho outmigration, which are expected to peak in April or May, but perhaps not chinook which have an extended and possibly bimodal outmigration pattern. It may not be possible to provide optimal outmigration conditions for all species.

40 Page 5-49, line 31, through page 5-50 line 19. In-channel and riparian habitat restoration of the proposed Howard Hansen Dam inundation zone. The reservoir will be at full pool from two to four months at the height of the growing season in most years (Figure 5-1), which should be

sufficient to kill all trees and other vascular plants. Can Tacoma provide a single example of a reservoir in this region that shows any sign of vegetation in the inundation zone other than algae, and occasional annual grass in the vicinity of seeps? Tacoma's hydropower reservoirs (Alder, Cushman, Riffe, Mayfield) are all have inundation zones devoid of vegetation. This HCP fails to cite any references to successful examples of terrestrial vegetation that can tolerate 2 to 4 months of inundation.

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Within a few years, the tree roots holding the inundated channel banks together will rot out and the banks will collapse and erode. Even if sedges or other plants can be established, they cannot replace tree roots in this capacity. Without bank re-enforcement, streams will braid into wide channels or scour to the bedrock, depending on the gradient. Shade and microclimate will be completely lost, thus, late summer water temperature in the inundation channels will likely increase 5 to 15 degrees centigrade. Invertebrate life cycles will not be adapted to such environmental changes, and effects on nutrient cycles are probably significant. Boulders will sink into or be buried by soft substrate, or sit on top of bedrock, such that no pools can be scoured. Anchored LWD will suffer a somewhat similar fate.

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In summary, we believe the proposed reservoir inundation zones are a total loss for salmon populations covered by the HCP.

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There may be a need for upstream juvenile fish passage restoration in the reservoir inundation zone, especially if the channel scours to bedrock, or becomes a very flat braided channel. Juvenile salmonids will need to move to viable habitat as the reservoir draws down and beats up in the late summer.

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Page 5-50, Line 21 through 24. This 'stream habitat rehabilitation plan' protects a stream adjacent parallel road, and the Lester Airstrip, and keeps the river partially disconnected from the floodplain. The road and airstrip are confining the channel to half its original floodplain.

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Page 5-50, Line 25-29. Stream habitat rehabilitation
above the inundation zone, and around the perimeter of the inundation zone. There are some good goals here, although some of the LWD size criteria may be too small. WDFW supports in-channel fish habitat enhancement where the watershed above is substantially stabilized (ie., a low incidence of landslides and other severe disturbances.). Durability of these structures is often over-estimated and recent guidelines and research emphasize the importance of very large wood sizes.

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Page 5-53, lines 9-16. *"Each debris jam will contain at least one Key-sized piece of LWD. In addition 50 pieces of LWD will be placed in the historic channel. Each piece of LWD will be at least 12 inches in diameter and 20 feet long."* Is 12 inches the average, minimum or maximum diameter of each bole? 12 inch diameter wood is probably falling in the river every winter. Without larger KP LWD or other obstructions to capture them, they either end up downstream

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46 high on the banks or in the reservoir. We would recommend fewer very large pieces, using the same recommendations developed in the paragraph below.

47 Page 5-53, lines 18-36. Mainstem LWD placement. *"Between RM 71.3 and 80.3 in the mainstem Green River, clusters consisting of three to four large trees with attached rootwads (at least 60 feet long; rootwads >= 4' diameter) will be placed approximately every 0.5 miles."* As a general concept, WDFW strongly encourages this type of activity.

48 Once again, we are concerned about the size of LWD proposed for placement. We are not sure what is meant by "rootwads >= 4' diameter". If the diameter is measured on the rootwad rather than the bole, this is too small. We are not sure of the width and confinement of the river channel above the dam, but it would likely be very important to go larger, i.e., >36" diameter at dbh (measured as if the tree were standing). Admittedly, the logistics of placing pieces this size are formidable. If smaller pieces are used, we recommend going slow on this. Placement on rivers wider than 40' should be regarded as an experimental. Place two or three jams, see how they hold for several years, and if these move more than 200 feet, consider larger pieces, or modify the design and location.

49 Is there any reason why the river above RM 80.3 is excluded habitat enhancement? There appear to be stretches of low gradient habitat for several miles above this point.

50 Page 5-54. Line 1-14. LWD placement in smaller creeks. It appears that this section refers to 4,600 feet of NF Green River, and 1200 feet Gale Creek. The use of Watershed Analysis Manual LWD size and frequency criteria are appropriate. We don't regard this proposal as experimental, and placement should proceed ASAP. However, avoid channels with a history debris torrents. Lines 13-14 talk about anchoring to maintain stability, if the proposed strategy results in too much movement. Larger LWD sizes should be emphasized, before anchoring.

51 **Are there other tributaries that have potential for LWD placements?** The lower 0.5 miles of Smay Creek appears to have potential when viewed from a coarse topo map. This is on Tacoma's land. Avoid channel segments with a history of debris torrents. Watershed analysis reports may help identify debris torrent prone channels.

52 Page 5-54. Line 18-25. 229 acres of forest will be left standing. The retention of standing timber (166 acres deciduous, 48 mixed forest and 15 conifer forest) resulting from additional water storage. Tacoma implies that there are fish habitat benefits.

53 None of the fish species that Tacoma wants protection from "take" for are lacustrine fish (primarily lake dwellers). There may be some use of the reservoir by juvenile coho, and perhaps other species. Submerged snags will provide some cover, although the alder snags will last less than 10 years. It is not clear what will happen to these fish in the late summer when the

temperature thermocline disappears, and the reservoir is drawn way down. Are they forced downstream? Is there downstream habitat available for them? Do some find their way upstream? Is there upstream access? Or can they survive in the reservoir? Will salmonids suffer predation and competition by warmwater species in the reservoir? These questions should be answered **(by review of the literature, and/or field research) before Tacoma should be given credit for inundation zone fish habitat.** Regardless, these benefits will not last long. 53

Page 5-55. Line 11-20. Fish transported around the dam should be wild stocks. If possible, the fish trap at the headworks should be used to sort out the hatchery fish. We should not be introducing hatchery salmon (*Oncorhynchus bovinus*)unless it is clear the wild fish cannot establish themselves. If Skykomish River above the Sunset Falls is an example, there shouldn't be any problem with wild fish becoming established. 54

Section 5.2.5, HCM 2-05, Juvenile Salmonid Transport and Release, p 5-57, line 17. The discussion concerning options to achieve self-sustaining salmon and steelhead runs above Howard Hanson Dam included the option of supplementation to "jump-start" recolonization. Supplementation is, by definition, a short-term process. The "long-term supplementation" idea suggested at line 17 is a conflict in terms. "Long-term supplementation" is a traditional hatchery program. 55

Page 5-59. Line 30-37. While this habitat enhancement idea appears to be a good one, the proposal should be view in context of scale. This is 3.4 acres. Compared to impacts of the raising dam (266 acres submerged, 3.0 to 3.5 miles of fish-bearing stream channels lost) and the hundreds, perhaps thousands of acres of lost floodplains in the middle and lower Green River, this is small. 56

Page 5-61. Line 30-34. The idea is good in concept, but the limits on LWD size immediately raises concerns. It is the very large or Key Piece LWD that provides the critical functions of anchoring log jams and capturing smaller wood, provide gravel retention, cover and other functions. The largest or Key-piece LWD anchors the aquatic ecosystem. The 12" bole diameter and possibly the 4' rootwad diameter are going to flush out or be deposited high on the bank, unless there is larger wood to hang-up on. There should be more focus on the very large or Key Piece LWD, or at least imitating their function. Without the KP LWD, you are not replacing lost LWD function caused by the dam. KP sizes are probably a minimum of 26 inches diameter and twice bankful width for the lower river. 57

Given the uncertainty as to what will work in middle section of the river, the situation is appropriate for adaptive management. This restoration objective does have a adaptive management element. 58

Section 5.2.9, HCM 2-09, Mainstem Gravel Nourishment, p 5-67. We appreciate that at least 59

the option for gravel replenishment close to actual source of the problem, Howard Hanson Dam, is left open. But, we believe the emphasis being placed on implementation below RM 45 is
59 inappropriate. The need for gravel replenishment in the Green River begins at HHD. Ignoring this upper reach essentially means writing off 20 miles of productive habitat for all species, but most especially chinook and steelhead.

60 Section 5.2.9, p 5-68, line 38. The prospective degradation of spawning gravels in the mainstem Green River ("Over time, this will ultimately result....") is already a reality.

61 Section 5.2.9, p 5-69, lines 14-16. The noted short residency of gravels in the channel upstream of Kanasket should serve to underscore the need for reestablishment of gravel recruitment to this reach.

Page 5-70. Mitigation for reservoir inundation focused on stream channels immediately above the limit of inundation. In general, this appears to be a good plan. This section is a far more practical approach to mitigating for inundation than attempting to restore habitat in the
62 inundation zone (i.e., comments on page 5-49 and 5-54 above). We assume the emphasis on anchoring LWD in this section is because un-anchored LWD will be lost to inundation as a result of occasional peak flow events and associated flood control management of the dam. Presumably, this will not kill riparian forest stands. If parts of the riparian forest are killed, there may need to be emphasis on planting inundation tolerant brush or trees (willows?).

63 Section 5.2.11, HCM 2-11, Snowpack and Precipitation Monitoring, p 5-72. We welcome the new capability to augment runoff forecasting accuracy.

Page 5-75. Forest Management Zones. The encroachment of roads, railroads, and utility corridors may have compromised the best habitat above the dam, that being the mainstem of the Green River. There is no information and no discussion on how this may affect the quality and future of
64 habitat on the mainstem. It appears that the railroad encroaches miles of the south bank. If so, water temperature may be significantly compromised. There is no discussion about opportunities to move some of these features out of the floodplain or to the outside edge of the floodplain in some locations, removing unnecessary roads, etc. Note that the Green mainstem above the dam and upstream to the Sunday Creek is entirely on Tacoma's land.

65 There appears to be a significant information gap regarding the actual extent of deveopment in undeveloped forestlands above the dam.

Page 5-89 line 23 through page 5-90 line 6. The Forest and Fish settlement takes the process
66 developed in the watershed analysis mass wasting module, and directs the state to apply it statewide as part of standard regulations. Tacoma should provide a performance review of their

66 mass wasting prescriptions every five years to determine their effectiveness.

67 Page 5-111 Road Abandonment. Excellent, but it would be more significant if the commitment were better defined, such as miles of road to be abandonned, or reduce road density to 4.0 miles/sq. mile.

68 Page 6-8 line 26 through 6-10 line 32. The discussion here ignores half of the problem. Gravel input is great, there is also a need to look at gravel retention. If the channel lacks the boulders, LWD and other obstructions, if it is confined, as a result of diking and straightening, the gravel will quickly flush downstream limiting its habitat function in large stretches of the channel. It may be appropriate to look at the balance between the input of gravel and slowing the rate of depletion.

69 Section 6.1, P 6-12, Compliance Monitoring. Compliance monitoring in regard to instream flows relates strictly to minimum levels provided for in the MIT/TPU agreement, not to actual needs of the fish resource. It is well documented that the MIT/TPU minima do not, for example, prevent major dewatering of wild steelhead redds and consequential losses of incubating eggs

70 and alevins. There are more examples. Also needed, is a clear description as to when, and if, the various elements of the MIT/TPU flow agreements would actually be implemented.

71 Page 6-23 table on hardwood conversion. "Single inspection one year after harvest". This monitoring will not be effective. The reason why there are few conifer is hardwood stands is that the conditions are difficult for young conifer. This may be due to deer and elk browsing, beaver and mountain beaver activity or competition with brush and alder. Hardwood stands usually require more intensive post-planting treatments to re-establish conifer.

72 Section 6.3, Research, p 6-50. Response to observed conditions limited. For example, response to meet the needs of steelhead incubation limited to the refill period only; steelhead incubation and emergence extends well after refill is complete and protection measures are solely dependant on withdrawel of water from storage. No apparent option or opportunity for extraordinary actions, such as sharing municipal storage, to protect resources under severe conditions.

73 Section 6.3.2, Monitor Steelhead Spawning, p 6-68. Steelhead spawning after June 1 is at risk because these will be the last fish to emerge. However, in June, spawning activity is on the wane and nearly over. Based on actual observation of steelhead spawning locations and emergence timing, steelhead eggs deposited in April or May, the peak spawning months, are often subject to the greatest risk because flows are generally much higher forcing spawning and egg deposition at higher elevations across the stream channel thus requiring the greatest flow for their protection and successful emergence

74 Section 7, Minimum Flow Requirements, p 7-2. Discussion does not define what minimum

flows apply when M&I water is being released from storage for diversion under SDWR. In
74 describing the minimum flows "benefits" that would derive from the MIT/TPU agreement, no mention is made key provisions would not be implemented in critical seasons.

Section 7.1.3.2, Middle Watershed, Potential Effects....on Chinook Spawning and Incubation, Water Withdrawal, p 7-41. As the statement at lines 29-31 correctly recognizes, IFIM may overestimate actual availability of suitable spawning habitat. This leads to significant underestimation of real impacts. Based on actual observation of chinook spawning activity,
75 flows below 400 cfs (at Auburn) force chinook to spawn in highly concentrated clusters, with their backs out of the water, and with much apparent overspawning. These sites, located along the thalweg, are also highly vulnerable to subsequent high flow scour, as is acknowledged later in this section. Combined, these several factors add up to considerably more impact than simple spawning area differences indicated by IFIM.

76 Tables 7-3, 7-4, 7-5, 7-6, Ibid, pp 7-52 to 7-55. See above comments regarding impacts to chinook spawning.

Section 7.7.3.2, Middle Watershed, Potential Effects.....Steelhead Spawning and Incubation, Water Withdrawal, p 7-133. As previously commented, IFIM tends to overestimate spawning habitat availability and underestimate flow related negative impacts. Because steelhead are not
77 spawning habitat limited, projected "gains" in spawning habitat related to reducing high flows during the spawning period are imaginary. Additionally, IFIM is blind to the fact that, regardless of flow, steelhead will choose spawning sites along stream margins. Consequently, steelhead are extremely vulnerable to post-spawning reductions in flow through the incubation period.

Section 7.7.3.2, p 7-134. The assumed 50-day incubation period for steelhead is too short and greatly underestimates the impact of project operations. In the Cedar River, the earliest that emergence **began** in 1998 was 49 days (mean 56 days) and was not complete until 58 to 78 days
78 (mean 66 days)(Burton 1998). Even these data may underestimate actual Green River steelhead emergence timing. In comparison to four other rivers, Cedar River steelhead had the lowest average number of days to the beginning and end of emergence (Burton 1998). We appreciate the discussion on page 135 acknowledging the Cedar River data and that emergence times may be longer. However, we feel the "modeling simplification" use of 50 days is inappropriate.

Section 7.7.3.2, p 7-135. The discussion beginning on line 18 regarding flow reduction impacts on steelhead spawnable width fails to recognize that steelhead use a small percentage of available
79 width estimated by IFIM. Rather, they are concentrated along the stream margins as determined by the flow when they spawn. Subsequent flow reductions therefore expose a much larger portion of the actual spawning sites.

80 Section 7.7.3.2., p 7-136, line 14. Gravel nourishment will be considerably more valuable for

80 steelhead if gravels were placed at Tacoma Headworks. Juvenile steelhead rearing habitat between the headworks and Flaming Geyser is of much greater quality than below. Chinook would also significantly benefit from, and take advantage of, improved spawning habitat availability in the Green River above Flaming Geyser.

81 Section 7.7.4.2., p 7-140, lines 12-15. The statement that late summer and early fall flows are "sustained at relatively high levels....by the minimum flow measures that have been established by the MIT/TPU Agreement." falsely implies that under the HCP there will be more water in the river than now. The MIT/TPU Agreement only "sustains" flows as a condition on the second diversion and then only when water for diversion is not being released from storage, which in late summer will be rarely the case. This and the continuing discussion at lines 17-24 implies the "HCP flow regime" (aka MIT/TPU Agreement) is actually intending to provide the water necessary to achieve the flows specified by this agreement. We wish that were the case. Except in exceptionally wet conditions, these flows are not achievable now, nor will they be achievable under the HCP. The comperisons of the "HCP flow regime" to "natural" is vacuous; the Green River hasn't seen natural flows for 100 years.

82 Tables 7-25, 26, 27, & 28, pp 7-144 to 148. See above comments concerning spawning habitat impacts.

TERRESTRIAL WILDLIFE

83 Due to severe time constraints, our review made direct comparisons with the last draft (July 1999 Working Draft) to determine which of the issues raised in our last comment letter (July 1999) were addressed and which were still unresolved. For many of the comments, therefore, we reiterated our earlier concerns. We also provided new comments relating to the monitoring component of the HCP. We apologize if we did not acknowledge or missed any of the significant improvements in this current HCP draft that may have alleviated some of those concerns.

General Comments

84 From a terrestrial wildlife standpoint, overall the HCP has significant features that will greatly benefit species over time, namely some of those associated with late seral forest conditions.

Habitat Conservation Measures for snag and green tree retention as related to Large Snag Associates *(Spotted Owl, Pileated Woodpecker, Vaux's Swift, Fisher, Marten).*

85 We commend Tacoma for committing to snag creation techniques. This is a very significant step forward for forest management. We applaud the TPU's commitment to increase mature and late successional habitat for the associated wildlife species in the Natural Zone and to a somewhat lesser degree in the Conservation Zone. However, it is unclear how adequate numbers of large

86 (>50 cm d.b.h.) snags and defective live trees will appear on the HCP landscape through time to

support all of the desired species for coverage at present, as HCM 3-01G (p 5-83,84) states that snags will be created from ≥12 inches dbh. As discussed in earlier comments (this letter and Dec. 1998), large snag-associated species of concern for which the HCP seeks coverage (i.e.,
86 spotted owl, pileated woodpecker, Vaux's swift, marten, fisher, and bats) have not been addressed completely in terms of the species' use of snag size and numbers needed, nor have appropriate snag densities or targets for each of these species been specified. Will large snag sizes be created during retention harvests, and what is an appropriate number to meet the needs
87 of the species of concern? (See comment below under HCM 3-01G.) Are there adaptive
88 management provisions for each species? WDFW can provide specific guidelines for large snag
89 associates, including estimation procedures for snags and large trees, based on the best available scientific information from research conducted mostly in the Pacific Northwest.

Habitat Conservation Measures: ***Bald Eagle, Goshawk, Peregrine, Pileated Woodpecker, Marbled Murrelet, Vaux's Swift, Wolf, Grizzly Bear, Wolverine.***
Generally the HCMs for these species appear somewhat vague by not outlining a clear process in which to objectively quantify and qualify habitat for future management of these species. This is
90 partially reflected by the lack of detailed compliance and effectiveness monitoring steps that were not outlined or included in this draft (see following comment). We suggest that the management plans for each species be explicitly stated with some spatial and temporal habitat goals in the HCP document to provide for a more effective management and monitoring strategy and not be addressed as any of the species may be encountered on a case by case basis.

Monitoring
The compliance and effectiveness monitoring sections and adaptive management guidelines for terrestrial wildlife at this point appear to be incomplete, missing or minimally developed (see comments below, Chapter 6). For example, please provide more detail as to how the section on
91 upland forest management (page 6-40, CMM-12) would work for the affected species, as there were references made to, but no management directions outlined in the text as a result of monitoring provided in this draft. For example (p 6-45, CMM-15 lines 26-34), how will Tacoma gauge the effectiveness of the proposed management guidelines to sustain biological function without a strategy in place to document the persistence of an occupied territory throughout the HCP term once the compliance monitoring summarizes the actions taken limit activities around raptor nest sites?

SPECIFIC COMMENTS:

Section 5.3
Page 5-79
92 Lines 16-18: Leaving 50 live, healthy dominant or co-dominant conifer trees per acre to be left at harvest in the Conservation zone is a very laudable goal and Tacoma is to be commended.

However, it is unclear whether the green retention trees that count toward the 50 are also to be composed of healthy live dominant/codominant trees. As Tacoma has acknowledged from our
93 earlier comments, there is a shortage of large defective wildlife trees on the managed landscape. WDFW also suggests that in addition to the green trees recruited, any large, live defective trees (for example >18" dbh), if present, be retained to benefit the cavity dwellers that use large trees into the next rotation.

Line 20-21: It is unclear why "a higher rate of harvest" would be necessary to meet habitat
94 objectives. Can Tacoma provide examples to justify when or where this management would be needed? Please list possible habitat modifications or develop criteria for justifying habitat modifications or increased harvest.

Page 5-80

95 Lines 16-19: Tacoma is to be commended for committing to no harvest of stands >100 years old.
96 If we are correct in assuming that larger cottonwood and bigleaf maples (i.e., not red alder) in riparian zones will be exempt from conversion, please state explicitly.

97 Lines 28-32: WDFW suggests that wording be added to the measure which would retain existing large defective live trees in the commercial zone.

Page 5-81 HCM 3-01E

See previous comment on large old maples and cottonwoods. There is much evidence to suggest
98 that these old trees provide highly desirable wildlife habitat and are worthy of retaining. We suggest that large, old hardwood (non red alder) trees should be exempt from conversion to conifer.

Page 5-82

99 Lines 25-34: Please clarify at what point would salvage conditions exist. Please define what
100 salvage means in terms of type of timber harvested: standing dead, fallen, lightly burned, etc.

Page 5-83. Lines 17-19

Please provide clarity of what a "significant area" means. As worded (lines 17-19) it is assumed
101 that only fallen timber on greater than 2 acres with <40% canopy closure can be harvested, and this constitutes "significant area".

We suggest that in these instances that more and larger logs be left on the ground to promote
102 late-seral conditions and benefit those species associated with large wood debris than would otherwise be left under normal harvest (non-salvage) conditions.

103 Lines 25-26: We suggest that Tacoma add language to retain any large live defective trees in addition to safe snags, if deficient in snags.

HCM 3-01G

Page 5-83, Lines 34-35 and p 5-84 lines 2-4:

104 We applaud Tacoma's commitment to create snags where deficient. However, we are somewhat disappointed that they would choose the smaller-end snags (at least 12 inches and 20 feet tall) as the criteria for snag creation, as it is more likely that the conditions for these sizes rather than large sizes will be present without having to create them. This would, in actuality, allow Tacoma to preclude any real snag creation of the larger sizes that are sorely needed in the managed landscape.

105 Therefore, in those stands where Tacoma has already committed to leaving 50 healthy dominants and co-dominants per acre at harvest, WDFW suggests that, for example, 5 to 10 of these 50 larger diameter trees per acre could be inoculated, topped, blasted, or otherwise killed at that time. This would provide a greater size range of potential snags for use, especially for the large cavity users of special concern (pileated woodpecker, fisher, marten, forest owls), and would go much further for providing biological function for these species, as well as accelerate true late-seral conditions. We also envision revisiting the natural and conservation zone stands for snag

106 creation at year 20, year 30, or 40 of the HCP to perpetuate the larger ones. In this way, much needed and valuable information could be obtained by controlling the number of snags created in different size classes and then comparing survival, persistence and decomposition rates trough time, such as every 5 or 10 years.

Page 5-84, lines 9-11;17-19:

107 WDFW believes that stands adjacent to (i.e., not in) the areas with a riparian strategy (e.g., new forest practice rules) are considered upland habitat, and therefore should have separate agreed-upon residual green tree and down wood prescriptions for those non-riparian buffer harvest units. Trees left in riparian areas, UMAs and UMA buffers and other reserve areas are for the benefit and function of those special areas and do not necessarily functionally contribute to the surrounding uplands. Therefore, harvest units outside these special areas should be subject to the full green tree, down wood, and snag measures agreed upon for all other upland units.
We contend that if trees are to be left for buffering a perennial non-fishbearing stream (i.e., some type 4s and 5s) as a riparian strategy to provide function for the *Rhyacotriton, Plethodon Dicamptodon*, and *Ascalpus* amphibians, for example, it is then questionable whether those trees will function as habitat for upland species not associated with the riparian areas.

108 There is also an issue of spatial extent; for example, the green trees left in a 25 foot riparian buffer on a type 5 would not adequately compensate for the number of required snags and green trees per acre that a 120-acre adjacent upland harvest unit would need, especially if the unit is designed to have a minimum of stream adjacency. While we agree that the intent of HCM 3-01G may be better than current Forest Practice Rules, WDFW believes that having a unit adjacent to the riparian area or UMA be exempt from HCM 3-01G is a serious flaw in the snag and green tree habitat conservation measure and could be less protective that standard forest practices,

especially if it is a large unit.

HCM 3-01J , page 5-86

109 Lines 25-30: See previous comment for Page 5-84, lines 9-11;17-19.

110 Lines 14-16: Similarly, if there are many small scattered UMAs (range from 1-30 acres in size) then potentially, the snag measure as written could have many harvest units that are adjacent but larger in acres than the UMA be exempt from snag and green tree HCM 3-01G, resulting is less protection than Forest Practice rules.

Page 5-94.

Table 5-3

111 Wetland buffers as written are not adequate to protect any resident and nesting western pond turtles (*Clemmys marmorata*), should they occur. If turtles are found, a site management contingency plan emphasizing extended buffers to avoid soil compaction around nesting areas should be implemented. (More information under *Western pond turtle*).

Table 5-3, "Type B (all) 0.25 to 5.0 acres"

112 WDFW suggests a prescription for protecting wetlands <0.5 acres. Recent evidence suggests that wetlands as small as 0.1 acre can represent significant source populations for some amphibian species (e.g., pond breeding amphibians) that find refuge from predators that are only able to persist in larger systems (Olsen et al. 1997). Wetland meadows of any size less than 0.25 acre can retain ephemeral pools sufficient for oviposition by breeding amphibians (Olson et al. 1997) that have some terrestrial life stages such as pond breeding amphibians. We suggest TPU adopt at least a 25-foot buffer for these smaller wetlands also.

Pages 5-114 to116

Grizzly Bear. HCM3-04A, B, C, D.

113 We are concerned that Tacoma does not appear to have identified in advance the steps necessary to protect grizzly bear habitat, without relying solely on the USFWS in a possible crisis situation. The primary function of having an HCP is to devise a detailed habitat plan for review in advance so that all major reviewers and the public will have input into the process.

Page 5-118

Gray wolf. HCM 3-04G.

114 We are pleased that Tacoma has extended the buffer to 1 mile and the timing restriction to July 15. However, as stated previously under Grizzly bear, Tacoma should have an agreed-upon strategy for the gray wolf in place and outlined in the HCP with the appropriate protective measures identified in the event a den or rendezvous site is located in a planned timber harvest area on or near the HCP plan area. Wolves are extremely sensitive to human disturbance, and we are concerned that 0.25 mile (1,320 feet) is not an extensive buffer to protect a first rendezvous site or whelping den. Being that wolves are extremely rare and endangered, WDFW suggests

that if a den is found, that a permanent site management strategy for long-term protection including implementation plans be identified in the HCP.

Page 5-119

Pacific Fisher. HCM 3-04H.

115 This measure provides only seasonal protection, which implies a lack of long-term commitment to pro-actively protect and manage for the State Endangered fisher. Fishers have been negatively associated with fragmentation (Rosenberg and Raphael 1986) and avoid areas with low canopy cover and early seral stages (Powell and Zielinski 1994).

116 The fisher is also listed as a Federal Species of Concern. WDFW suggests that an active management plan could be implemented to ensure that adequate den habitat attributes (largest available snags, e.g., pileated woodpecker excavations in contiguous areas of mature forest that are <1200 meters [3900 ft] elevation; Aubrey et al. 1998) would exist on the plan area through the life of the plan. Snag creation of the larger dominant and codominant trees would be a good

117 strategy The HCP should identify a long-term strategy for protecting known or likely den sites so that they may increase the probability of remaining viable in the future.

Page 5-120

Wolverine HCM 3-04I, and Canada lynx HCM 3-04J

118 It is recognized that seasonal timing restrictions do little for long-term protection of endangered species and habitats. Consequently, we believe the proposed conservation measures for these two species do not adequately specify the likely amounts of suitable habitats needed or that are present on the plan area. Should denning occur on the plan area, Tacoma has identified no plan or strategy to insure that denning habitat would remain suitable in subsequent years after the timing restrictions are removed.

Page 5-123

Bald Eagle nests HCM 3-04M

119 We applaud the commitment to permanently protect eagle nest trees. However, WDFW suggests lengthening the breeding season timing restriction from January 1 to August 31 as eagles in Washington all tend to disperse by August 31 (Watson and Roderick 1998, Issacs et al. 1983, Watson et al. In Prep.). Also, the nesting buffer around permanent nests and winter night roosts

120 should be extended to a minimum of 400 feet to be consistent with the PHS guidelines (Watson and Roderick 1998).

121 We would strongly recommend that Tacoma implement a site by site management plan to comply with the ESA and the State Forest Practice Rules. Section 7.13 states that overall the HCP will benefit the bald eagle, but no specific data exists to support or substantiate the statement.

122 While it may be likely that restoration of anadromous fish will benefit non-breeding eagles feeding on spawned out fish, there is no evidence to suggest that further diversion of water from the Green River will not have negative effects on eagles. Further draw downs and diversion of

the Green river seems contrary to recovery of anadromous fish stocks in the river, which could indirectly affect eagle foraging and presence.

Page 5-125,126

Spotted owl. HCM 3-04O,P

123 We applaud TPU's intent to "specifically promote and maintain late-seral forest habitat conditions for spotted owls" on "roughly 52% of the upper HCP area which is forested land within the Natural and Conservation Zones". However, we reiterate our earlier concerns: it is

124 unclear as to which kinds of prescriptions will provide functional owl habitat in the Conservation Zone and at what time period. Will monitoring and surveys be done every year around known site centers?

125 Spotted owls do not reproduce in all years, so that dropping seasonal restrictions for mated pairs that have failed or not attempted to breed in any given year is very clearly inadequate, and does not provide any benefit to long-term survival.

126 WDFW generally believes that seasonal timing restrictions at nests are not adequate to perpetuate spotted owls on non-federal lands across the landscape. Potential habitats that appear to have adequate nesting habitat should be identified, mapped and surveyed. Under the rationale and benefits for HCM 3-04P, it is stated that "the long term proposal of 31 acres of forested buffer around site centers" is "not expected to be sufficient habitat to support long-term nesting if the adjacent habitat is harvested." There are no resource objectives defined stating acres of suitable owl habitat currently available and in the future, and thus there is no biological certainty that the buffered habitats on Tacoma land in the HCP will provide much, if any, contiguous habitat for displaced owls to relocate to. (Also see comments under *Large cavity associates.*)

Page 5-127,128

Northern goshawk. HCM 3-04Q, R

127 While we are encouraged by Tacoma's willingness to buffer 660 feet around known nest sites (about 31.4 acres), we strongly suggest that the acreage equivalent that utilizes the best suitable nesting habitat available be used in lieu of a circular buffer, and that goshawk site management plans be implemented for active territories. We are also encouraged that longer rotations on the

128 HCP plan area should result in an increase in potential for goshawk use and a temporary increase in suitable habitat.

129 As written HCM3-04Q is inadequate. Seasonal timing restrictions should be increased to 0.5 mile buffer to provide for the movement of young goshawks within the Post-fledging Family Area (identified as the area in which young learn to fly and hunt while still partially dependent on the adults; Kennedy et al. 1994, Reynolds et al. 1992). The timing restriction should be

130 increased to September 31 to allow for all fledglings to disperse (Reynolds et al. 1992, Finn et al. 1998).

131 Suitable habitat is defined as >70% conifer, >60% canopy closure, and mean nest stand dbh of ≥ 18 inches (Reynolds et al. 1992). Suitable nest habitat should be composed of mostly mature and older forest, and that there should be a total of 3 nest stands of 30 acres each located within 0.5 mile of each other (Reynolds et al. 1992, Hays and Desimone, in press).

132 In addition, core use areas (90% of locations of breeding adults) averaging 350 to 580 acres have been identified in western Washington (Finn et al. 1997, 1998).

133 Non-occupancy of a nest does not necessarily mean unoccupied territory. Severe disturbance such as alteration of a nesting territory familiar to a pair during the breeding season, even if failed earlier, will likely result in abandonment of the territory and displacement of the pair. A breeding pair will still continue to occupy the territory after a failed nest attempt. Goshawks may build several nests within an aggregated nest stand cluster. These "alternate nests" and their potential for use should be addressed in a management plan.

134 Ecological and restoration thinning may be needed to hasten forest development to attain nesting structure conditions most preferred by goshawks and to increase healthy populations of prey. Please cite reference for habitat models that were used to identify suitable habitat. We are concerned that there is no adaptive management/monitoring plan in place to determine the persistence of goshawks on the plan area. A potential benefit to Tacoma would be to document noted increases in goshawk territories and use on the Plan area when they occur, and implement meaningful protection measures. This would represent some level of achieving success in implementing the HCP for wildlife benefits. WDFW suggests that Tacoma conduct baseline information surveys for goshawks in areas likely to have nesting habitat in the watershed and monitor them periodically.

Page 5-128,129

Pileated woodpecker HCM 3-04S

135 This measure is clearly inadequate as written. Pileateds require a closed canopy forest around nesting and roosting snags. HCM3-04S makes no provisions for this. Some buffer of acres around active pileated nest or roost sites should be maintained in the commercial and conservation zones.

136 Also, pileated woodpeckers probably represent a keystone species, as they provide through their excavations, habitat for denning marten and fisher, roosting and nests for flying squirrels and Douglas' squirrels, nests and roosts for Vaux's swift, forest bats, small owls and others. Given the importance of the pileated's presence on the landscape, the HCP could manage for a reasonable target of pileated woodpecker pair density.

137 For pileated habitat use in western Washington on mixed ownership lands, Aubrey and Raley (1996) found radioed pair home ranges averaged about 2100 acres (this would equate to potential of about 5 pair home ranges in the Natural and Conservation zones combined). By managing for pileated woodpecker and identifying goals of numbers and sizes of snags for suitable habitat, coverage of associated large cavity users would be fully justified.

Page 5-129,130
Vaux's swift. HCM 3-04T

138 See discussion under *General comment: Large snag associates*. Large hollow snags and defective live trees averaging 25 m tall and 68 cm dbh are primary roosting and nesting habitat for this species. WDFW suggests that large diameter, tall and hollow roost trees for swifts are rare, and as such should be adequately buffered from disturbance. The Plan does not outline the size of buffers that will protect significant large hollow snags, nor is there an indication as to how

139 well distributed they are. Would Tacoma consider a 250 foot buffer (about 5 acres) to increase the likelihood of retaining tall snags?

140 Insecticide use should be prohibited within 500 m of snag habitat or sensitive riparian and wetland areas (Lewis et al. 1998).

Page 5-132
HCM 3-04W Marbled murrelet.

141 All known "occupied" and "presence" sites in and adjacent to the HCP area should have a management strategy outlined in the HCP document to insure that the appropriate buffers are implemented for compliance with the ESA. WDFW suggests that seasonal timing restriction be increased to 0.5 mile around occupied murrelet habitat.

142 The Green River watershed may represent a significant contribution for the recovery of murrelets in the Washington Cascades; there currently exits a large gap (at least 7 townships) between the Mount Rainier/Carbon River known sites to the south and the North Cascades known sites north of I-90 (there is currently one site on the Cedar River watershed). The importance of ongoing protocol surveys in the Green River watershed cannot be overstated. For the USFWS and WDFW to most effectively manage for the murrelet, all planned harvest activity that may affect likely suitable habitat or adjacent likely suitable habitat should be surveyed.

143 While it may be true that there are currently no known murrelet occupied sites on the proposed HCP area, there are concerns of adjacency issues with other landowners in the Green River watershed that do have occupied murrelet stands. These adjacent murrelet stands would benefit from Tacoma's cooperation by extending the recommended protective buffers onto Tacoma's land.

In addition, there are other concerns that WDFW has:

144 All "hard-edged" stands having Presence or Occupied status should be protected with a 300-foot buffer. A buffer of this type will greatly enhance murrelet habitat by ameliorating climatic conditions for interior forest conditions (Chen et al. 1993) and providing some protection from wind disturbance. Management could include some restricted harvest. For example, pole stands directly adjacent to murrelet habitat could be partially harvested. The actual degree of harvest, basal area targets for retention, and tree size would need to be negotiated.

145 Murrelet habitat that is insular and surrounded by early seral and sapling-pole habitat (i.e., a clear dichotomy between habitat and non-habitat) where protocol surveys have detected murrelets as

"present" should be considered to be qualified as "occupied" status. If birds are low enough to be
145 detected, and no other habitat exists in the surrounding landscape, the probability is very high that the birds are using (i.e., occupying) the stand being surveyed.

HCM 3-04 and 7.17 Oregon spotted frog.
Spotted frogs lay their eggs in very shallow water, usually <6 inches deep (K. McAllister, WDFW, pers.comm.). We are very concerned that untimely water drawdowns and fluctuations would be detrimental to any breeding attempts by causing desiccation of eggs. We suggest that
146 Tacoma refrain from reservoir drawdowns and fluctuations along the middle and lower reaches of the Green River from February 1 to April 1, which coincides with the start of egg laying to the end of egg-hatching. This should be stated explicitly in the HCP. Without these protective measures in place, this species should be considered for removal from coverage.

Page 5-130
Larch Mountain salamander. HCM3-04U.
Lines 20-23 need clarification; as stated we interpret this to mean that all talus fields >0.5 acres
147 receive a buffer of 100 feet from harvest, yarding road construction and aerial application of pesticides.
It is unclear why there is a dichotomy between unforested talus and forested talus in terms of potential habitat for the Larch Mountain salamander (LMS). WDFW contends that forested talus may represent better (and therefore more suitable) conditions for LMS by having trees ameliorate
148 the microclimate by shading the rocks to provide cool, moist conditions LMS prefer. We agree with Tacoma as stated (p 5-119, lines 3489-90, July 1999 Working Draft) that it is "important to protect all significant patches of suitable habitat, at least until more is known ...[about] the species." Can Tacoma please explain how a distinction will be made between suitable and non-suitable forested talus?
WDFW suggests that Tacoma state in the HCP that talus patches <0.5 acre be protected and buffered as they are encountered in the course of operations in the HCP. Talus fields <0.5 acre
149 and forested talus slopes likely represent potential breeding habitat to LMS and should be considered as important. Talus <0.5 acres should receive some level of protection from disturbance, at least in the upper basin, especially if Tacoma believes that the upper HCP area has the potential to develop a source population (Page 7-180, Lines 17-21).

Page 5-132
Northwestern pond turtle. HCM 3-01X
150 We are pleased that Tacoma seeks our input into developing site prescriptions for occupied pond turtle habitat.
The best available information suggests that all wetland and lacustrine environs that occur at
151 ≤1000 feet elevation should have a buffer of 1600 feet to prevent disturbance and soil compaction. The HCP needs some language to this effect to ensure that biological function is attained by buffering an occupied site.

Chapter 6 Monitoring and research

Page 6-45

6.1.15 Compliance monitoring CMM-15

This monitoring scheme is very general and lacks detail to sufficiently assess the compliance (table 6-2, page 6-47) of the forest operations and effectiveness of the monitoring (see related comment below, on 6.2.1 EMM-01) to assess the effects on the terrestrial wildlife species sought
152 for coverage. For example, Lines 35-39 (p6-45) reference that in the section "upland forest management monitoring" (no CMM or page number given) that compliance of trees and snags for pileated woodpecker and Vaux's swift will be reported there; however, that section on page 6-40 makes no mention of these or any other terrestrial wildlife species. We would ask Tacoma to please explain and provide more details on how upland wildlife will be monitored.

Page 6-48

6.2.1 EMM-01

WDFW is pleased that Tacoma will implement a snag and recruitment tree management and
153 effectiveness monitoring plan. Collecting this information has the potential to be a valuable contribution to our knowledge of snag and retention tree dynamics, but only if a well thought out and detailed study design dictates the level of information needed to evaluate the effectiveness of the snag and retention measures per acre. Does Tacoma have any details on study design and hypothesis testing in mind? WDFW would have some interest in cooperating in such a study,
154 and would appreciate knowing when details on study design of the monitoring plan would be available.

Page 6-49

6.2.2 Species specific habitat management validation: EMM-02

155 Lines 16-17 indicate that the species-specific measures are to be found in chapter 4; we assume Tacoma means Chapter 5.

A monitoring program for terrestrial wildlife should be developed, or at least a detailed outline
156 should exist before HCP implementation, stating the reporting time periods and actions to be taken if stated goals are not met. These elements were not described or are missing, and are essential to implementing adaptive management guidelines for mid course corrections.

Chapter 7. Effects of water diversion and wildlife conservation measures

7.20 Cascade torrent salamander

7.21 Van Dyke's salamander

7.23 Tailed frog

(pages 7-177 to 180) There are many information gaps for these 3 species. It is assumed by most
157 researchers that protective buffers will suffice, but how these species will react is uncertain. Therefore there needs to be language in the document that outlines steps to be taken to adequately provide the habitat needed (e.g., increased buffer widths) if monitoring indicates a

species decline or absence. From the maps provided, it appears that little if any head wall streams (primary habitat for torrent salamander) exist within the HCP boundary. Has Tacoma
158 been able to assess if habitat is present on the plan area?

7.30 Common loon.

(Page 7-185) The HCP does not adequately assess how raising the dam and inundating the lake shore will affect the nesting loons, and defining what measures to protect nest sites will be
159 needed in the event of water level fluctuations during the breeding season. Water level fluctuation in reservoirs has been shown to significantly reduce nest success by flooding and or stranding nests (Fair and Poirier 1992). Mitigation techniques that could be implemented are (1)
160 carefully timed water level changes, and (2) floating nest rafts. TPU needs some mitigation measures to this effect to achieve biological function for the continued persistence of loons. Floating nest raft structures may be the best and most cost effective way to achieve this.

Literature Cited

161 Burton, Karl and Rand Little. 1999. Cedar River steelhead monitoring program. Annual Report, 1998. Seattle Public Utilities. 11 pp.

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March 31, 2000

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Dear Mr. Romanski and Mr. Grady:

1 Thank you for the opportunity to respond to the issuance of the Incidental Take Permit (ITP) Application from Tacoma Public Utilities (TPU) and for the extension of the public comment period. We have reviewed the following documents related to the application:

- Tacoma's Proposed Habitat Conservation Plan
- Draft Implementation Agreement; and ,
- The Services' Draft Environmental Impact Statement

2 This NEPA Draft Environmental Impact Statement (DEIS) and the accompanying documents describe the TPU Green River Water Supply Operations & Watershed Protection Habitat Conservation Plan, to divert water and manage watershed uplands with possible impact to 32 listed and unlisted fish/wildlife species in the Green River basin. We share in the goal to have a healthy river system where the fish and wildlife flourish and the municipal needs of TPU are met.

3 There are many areas where the management regimes that are identified and committed to in the long term will be of great benefit for Upper Green River riparian areas. We commend TPU for their commitment to resource protection and enhancement. However, unless several issues relating to potential permitting requirements, adaptive management needs, and a need for coordination of operations and planning throughout the river system are adequately dealt with, we believe that the issuance of an ITP to the Utility may be premature.

4 The Green-Duwamish River system has been substantially altered over the years, and much of the change is irreversible. The construction of Howard Hanson Dam in the early 60's is the most recent major impact to the water quality and flows on the Green River, and it has contributed to the loss of fish stocks. This structure has eliminated several key

habitat-forming functions from the lower and middle Green River watershed for the last 40 years. The diversion works and the dam combine to significantly to alter the natural flow variation which in turns affects the recovery of fish stocks in the River. The listing of Chinook and Bull Trout together present a unique challenge. Presently, the Services are
4 working closely with the Tri-county Salmon Recovery effort on a package that would be included in the Chinook and Bull Trout 4(d) rules. A part of this package includes a watershed assessment and the development of a watershed plan which when implemented would lead to the recovery of Salmonids for the river systems in a three county area. The Green–Duwamish is included in this effort. The approval of this HCP should not shift the burden of recovery or foreclose the use of information developed from the Green-
5 Duwamish River watershed assessment and the subsequent recovery plan.

We would like to note that recently there was a DEIS out for public comment on the Second Supply Project, and in August 1999 the Army Corps of Engineers (ACOE)
6 published their Master Plan for the Howard Hansen Dam - Eagle Gorge Reservoir Project Master Plan. We believe that these documents relate to the above ITP application. There is a need to look at these various documents together, as there are linkages among many of the issues related to facilities, operation and environmental management of the upper Green River Watershed.

The following represent key areas of interest we have in the ITP application and its relationship to other activities in the Upper Green River watershed *(In addition, we have enclosed several more specific comments for your consideration):*

- The Services are required to "Rigorously explore and objectively evaluate all reasonable alternatives, and for the alternatives which were eliminated from
7 detailed study, briefly discuss the reasons for their having been eliminated." Alternatives in the EIS focus on the diversion of water from the Green River and timber management. We suggest that it is reasonable to include an alternative that addresses habitat protection in the Upper Green River Watershed.

- There is a need to more clearly establish how the Utility will work with other land and facility managers in the Basin to decrease impacts to water quality and to fish
8 and wildlife habitat. How will the HCP contribute in a coordinated way to properly functioning conditions in the basin that lead to the recovery of listed fish stocks and the prevention of additional listings?

9 • The Habitat Conservation Measures (HCMs) discussed in the HCP need to be clearly linked to properly functioning conditions for fish in the basin. There should
10 also be a clearer link made to the science that justifies the HCMs as the ones that will recover the loss of wild salmonid stocks in the basin over the life of the HCP.
11 In conjunction with this we would like to see a more detailed explanation as to the benefits of the trap and haul proposal over the next 50 years.

• The Department of Ecology is concerned with the lack of an agreement between the ACOE and TPU regarding flows in the HCP (other state agencies are also concerned with the lack of an agreement). Flow levels in the Green River HCP will
12 be difficult for TPU to manage without considerable coordination with ACOE. In a recent meeting with TPU the Department of Ecology was very encouraged to hear from TPU officials that TPU is negotiating an Operations Agreement with ACOE on the HHD, which may address many of these water quantity and water quality concerns. It is Department of Ecology's understanding that this Operations Agreement will be incorporated into the HCP.

13 • Likewise, the activities occurring in the upper Green River Watershed cannot be isolated from the rest of the River basin nor from the other property owners in the basin.

14 • The Department of Ecology is concerned about the fifty-year time period of the proposed HCP, the issue of "unforeseen circumstances and no surprises" and what role the state will have on changes that occur over this time period. We have requested further clarification on the Green River Flow Management Committee
15 membership, and committee decision making processes. The role of the ACOE and their relationship with TPU, and their combined relationship with the committee, needs to be more clearly defined.

• The Department of Ecology has concerns regarding the scope of the Monitoring and Research Program described in Chapter 6. The role of Adaptive Management should be strengthened in this section of the HCP. Adaptive Management has been defined in state law as "reliance on scientific methods to test the results of actions taken so that the management and related policy can be changed promptly
16 and appropriately. There are two issues: 1. Adaptive Management should be occurring based upon the information received from the compliance and effectiveness monitoring in the HCMs. The use of this data should be an integral part of future decision-making. It should not be something that gets done only when specific research projects are being completed. Each of the HCMs' therefore, needs to identify the monitoring component and what will be done with

16 the information obtained. 2. The Tri-county Salmon Recovery Effort is developing an Adaptive Management and Monitoring system that may be utilized by participating jurisdictions in the implementation of recovery plans for the middle and lower Green river. Consistency and coordination between the practices in the upper watershed with the middle and lower watershed are critical. Adaptive management and monitoring needs to be consistent throughout the river basin.

17 We appreciate and support the cooperative effort between the City of Tacoma and the Services to build an HCP for the Green River Basin consistent with the goals and provisions of the ESA. The Department of Ecology would also like to provide regulatory certainty to Tacoma in response to their ESA efforts and municipal activities. Our department is striving to be clear regarding outstanding issues in the HCP and our interests relating to water resources and water quality. The manner in which these and other important issues are managed will ultimately impact people, fish and the environment.

18 Our department will continue to work with the Services, Tacoma, other agencies, governments and Tribes to help ensure that all pertinent and important issues are adequately addressed and represented in the HCP and ITP. By working collaboratively, we can provide certainty to Tacoma regarding water supply and also share in the goal of fish recovery and protection of our natural resources.

Sincerely,

Janet Thompson by MG

Janet Thompson
Senior Planner

Enclosure

cc: Mike Green, United States Army Corps of Engineers
Paul Hickey, City of Tacoma
Isabel Tinoco, The Muckelshoot Tribe

GREEN RIVER Draft EIS and HCP COMMENTS ADDENDUM

Draft Implementation Agreement

19 • 2.2(c): This section does not acknowledge the role of adaptive management and monitoring as part of the assurances that this HCP will contribute to the recovery of resource functions in the long-term.

20 • 4.2.3 Water Supply Protection: This section does not acknowledge the states' role in the regulation of water quality and water resource allocation. It does not identify what happens to water supply protection if significant unforeseen circumstances occur to the water flows.

21 • 4.3 Interim obligations upon a finding of unforeseen circumstances: This section does not articulate the process by which the federal agencies make a finding of unforeseen circumstances.

Comments on the Proposed Green River EIS

Table S-1 Ownership and Land Use Page S-4

22 **Ecology Comment:** Ecology believes that land use practices can have an effect not only on instream flows with flooding in the winter and gradual decline in the summer, but also can impact water quality. Ecology encourages Tacoma to work with surrounding
23 landowners to make sure that their land use practices minimize the impact and effect on the Green River resource.

Table S-1a Fish flows Page S-7

Ecology Comment: Ecology issued a permit to Tacoma in 1986 which allows for 100 cfs to be withdrawn from the Second Supply Project to provide water to Pierce and south
24 King County. The 100 cfs can only be withdrawn if instream flows are being met. Tacoma has met with Ecology and stated a willingness to have Chapter 173-509 WAC amended to include the flows Tacoma agreed to with the Muckelshoot Indian Tribe (MIT). Ecology would need to go through the public rule making process to amend the rule for the new flows.

25 The permit, S1-00726, has a construction schedule and with reasonable due diligence to perfect the use of the water by 2006. It does not appear that the water will be put to

25 beneficial use by then. It appears that Tacoma will need to file an extension under Chapter 90.03.320 RCW. Ecology will make an evaluation of the extension request using criteria in the statute.

Table S-1a Ownership and Land Use

26 **Ecology Comment:** Tacoma has done a good job in acquiring much of the riparian zone. However the continued land use operations from Tacoma and all the other land use owners in the upper portion of the watershed may result in impacts on stream flows and water quality. We would prefer to see a document which provides a complete picture of what each landowner is going to do with land use and other activities in order to protect not only the water resource and quality, but the wildlife and habitat as well.

Page 1-1 "Tacoma Water supplies water to approximately 83,000 service customers.... It expects to increase its diversions to meet growing customer demands."

27 **Ecology Comment:** Tacoma needs to specify if the increase will come from existing surface water diversions or ground water withdrawals. Ecology encourages Tacoma to list each source and the amount of water Tacoma uses and expects to use on an instantaneous and annual basis for each source.

28 Ecology has issued a permit for a diversion of 100 cfs with the Second Supply Project if instream flows are being met. Ecology expects that the growing population demands will be addressed by the Second Supply Project. Ecology also believes that many of the growing population demands can also be met by increased efforts in conservation as well as evaluating other options like water reuse. If these options were to be maximized, then more water would left in the Green River for instream benefits.

Page 1-10 "In the Local Reliance scenario... varying with the scenarios of the year."

29 **Ecology Comment:** If Tacoma needs to file a permit extension request for permit S1-00726 with the Department of Ecology pursuant to RCW 90.03.320, Tacoma should be aware that an extension approval is a discretionary decision by Ecology. Any permit extension decision includes many evaluation factors such as ensuring that the demand exists for the water and that due diligence has occurred in completing and putting water to use. Furthermore, Ecology will look to the Washington State Department of Fish and Wildlife to make sure that the flows are still adequate for fish.

Page 1-12 "A third alternative is proposed for each category.... As an Alternative"

30 **Ecology Comment:** Tacoma has worked to acquire lands in the upper watershed. Most of its lands are the riparian zone. Unfortunately, Tacoma has only acquired around 10% of all the lands in the upper watershed. Private timber companies and other land owners own the remaining lands. The impacts of logging by all the landowners will have an effect and impact on the water resource. Ecology suggests a document, which describes and graphically would show where all of the upper watershed is protected and where logging or other land used will occur.

Page 2-1 "...and a third alternative involving construction of a new water withdrawal facility (diversion) ...

31 **Ecology Comment:** A change in point of diversion will need to be processed and approved through a change application with the Department of Ecology.

Page 2-3 "Tacoma Water supplies municipal and industrial...to participate in a regional intertie with suppliers in King and Snohomish counties to make...intertie is a water conduit system that allows an exchange of water between adjacent suppliers and service areas).

32 **Ecology Comment:** Ecology has approved water to be diverted through the Second Supply Project, which should provide a new water source to many communities in Pierce and South King County which have the demand and need for this water. Tacoma needs
33 to explain how they are complying with RCW 90.03.383. As it appears the statute has internal inconsistency, Ecology will continue to work with Tacoma Water and
34 Washington State Department of Health and other purveyors who have water system plans on appropriate use of interties.

Page 2-3 "Tacoma Water's current and potential future obligations as a regional supplier of water...in these geographic areas"

35 **Ecology Comment:** Tacoma will likely be signing contracts with purveyors and entities that need water. Any water right provision or requirement by Ecology applies to all users of that water.

Figure 2-2 Tacoma Water geographic service areas.

36 **Ecology Comment:** Please provide the area Tacoma believes it will serve with the municipal water from the Second Supply Project.

Page 2-7 "Tacoma evaluated several water resource options...included conservation..."

37 **Ecology Comment:** Ecology recognizes that conservation measures are in Tacoma Water System Plan Tacoma should identify the criteria for mandatory curtailment and to whom does the curtailment apply.

Page 2-24 "A water reuse feasibility.... to define the feasibility of industrial reuse in the Tacoma area."

38 **Ecology Comment:** Many of those who could use water reuse include irrigators. Much of the irrigation season is during the dry months of the year. Ecology strongly encourages Tacoma to consider additional water reuse options, as this could free up additional water for instream flow purposes.

Page 2-25 "At the Simpson Tacoma Kraft Mill.... up to 8 mgd of water conservation savings were identified and 12 mgd of water savings through water recovery and reuse.

39 **Ecology Comment:** Ecology would like to congratulate Tacoma and the Simpson Kraft Mill for taking the steps of saving significant amounts of water. Such efforts applied throughout many other industries and schools in Tacoma as well as other purveyors that receive water from Tacoma will result in a greater water saving and thus providing long term security of this resource.

Pages 2-25-2-28

40 **Ecology Comment:** The review would be more complete, if Tacoma's Water Rights and Claims were added to the appendix as well as referenced in the HCP.

Page 2-27 "It is possible that additional costs for groundwater treatment facilities might be necessary when artificial recharge proceeds. However, the pilot study indicated that further treatment will probably not be needed."

41 **Ecology Comment:** If Tacoma decides to continue with the artificial recharge project, please ensure that water rights exists not only for the water used to recharge the aquifer, but, also, for the water being withdrawn from the aquifer.

Page 2-28 "Limiting Tacoma Water's Service area was not considered to be practicable water supply option because no adequate water supply replacements exist..."

42 **Ecology Comment:** Ecology's current understanding of statutory and common law relating to water management does not provide for a dynamic place of use. In fact, Tacoma needs to define its place of use. Ecology will continue to work with Tacoma and Washington State Department of Health on this issue in reviewing of the water system plan.

Page 2-28 "Because Tacoma is unable to identify alternative water supplies…"

43 **Ecology Comment:** If Tacoma were to decide to move its diversion point or add an additional point of withdrawal, Tacoma would need to file a change application at Ecology.

Page 2-31 "The Services would issue an ITP for the incidental…. concurrent for 50 years.

44 **Ecology Comment:** Since the United States Army Corps of Engineers (USACOE) is proposing to increase its storage behind Howard Hanson Dam and essentially expanding the dam operations from flood control to flood control, municipal water supply, and instream flows, a water right may be needed. Ecology has told Tacoma and the USACOE that a reservoir permit may be needed.

45 Tacoma has advised Ecology that it would like Chapter 173-509 WAC amended to reflect the MIT/TPU agreement on flows. Nevertheless, the dam will be storing more public water than previously and the operation has changed. Ecology has asked and will continue to ask for the criteria and decision making elements that the US Army Corps of Engineers will use in storing and releasing flows. Ecology believes that a reservoir water right for the storage or secondary water right for the management of additional public waters may be required.

Page 2-33 "In 1933, Tacoma Water Filed a request with the State of Washington for the right to divert an additional 100 cfs…the state held the request in abeyance indefinitely."

46 **Ecology Comment:** Ecology would prefer to change the language to, "…the state held the request until 1979, when Tacoma Water request that Ecology reconsider…."

Page 2-35 "…Tacoma Water has requested that the USACOE to store up to 20,000 acre-feet of the Second Supply Water Right behind Howard Hanson Dam during the spring. The USACE would then release the water for municipal and industrial water supply during the summer. An additional 5,000 acre-feet would be stored at the discretion of federal, state, and tribal resource agencies for fish purposes, in addition to the 24,200

acre-feet currently used to augment summer flows to benefit instream resources downstream of the Howard Hanson Dam..."

47 **Ecology Comment:** Ecology is encouraged by the leadership of Tacoma and the USACOE in using existing resources in a way, which will benefit industry, people, and the fish. Nevertheless, the storing of additional public water beyond the confines of the
48 original federal project for new purposes may need a reservoir permit. The releasing of those flows also may need a state water right.

Page 2-37 Table 2-11 HCM 1-01

49 **Ecology Comment:** Please list the conservation measures and the seasonal restrictions on the first diversion water right.

Page 2-37 Table 2-11 HCM 1-02

50 **Ecology Comment:** Ecology believes that seasonal restriction is important and essential. Please list the conservation measures and the criteria for seasonal restrictions.

Page 2-39 "...under Water Withdrawal C a new diversion structure would be constructed on the Green River at approximately RM 29.2...."

51 **Ecology Comment:** Any new place of diversion would require a change application to be filed and processed first by Ecology.

Page 2-46 "Tacoma Water would manage according to three...Rules:"

52 **Ecology Comment:** Ecology fails to see how Tacoma can provide predictability on the lands in the upper watershed without owning them. One way to improve predictability is to acquire more of the watershed lands.

Page 2-50 "there would be not net increase in the miles of roads in the Natural Zone;"

53 **Ecology Comment:** Ecology is pleased that Tacoma will ensure that there is no net increase of roads and that any new roads can only be constructed on stable soils. Ecology would encourage Tacoma to have a net decrease in the miles of roads and that any remaining roads will only be on stable soils.

Page 2-68 Table 2-18a. DIVERSION OPERATIONS Alternative C

54 **Ecology Comment:** A new diversion facility will need either a change application from existing rights or a separate application for a new diversion for new public water.

Page 3-23 "Water quality standards for fecal coliform are frequently exceeded in parts of the lower and middle Green River and its tributaries...

55 **Ecology Comment:** Will the federal government hold Tacoma responsible for effects on the lower watershed and the impacts they have on fish? Ecology could better understand
56 the impacts and effects on the Green River for water quality, water resource, and fish if a complete plan were provided. Tacoma is willing to protect their portion of the resource
57 in the upper watershed for their purveyors and for fish. But will the activities of their upper watershed neighbors and entities downstream make these actions negligible.

Page 3-53 "...The diversions enabled the salt water from the estuary to move further upstream than before, to roughly RM 10.0 under low summer flows and high tides; a salt wedge is usually found to RM 7.0...

58 **Ecology Comment:** Has there been any movement on the salt wedge over the last few years? Is the trend moving the wedge further upstream? If so, please provide such details.

Page 3-55 "During the winter, Howard Hanson Reservoir is held nearly empty between storm events...Dam project.

59 **Ecology Comment:** Please provide the USACOE operating procedures on how the dam will be managed. Please provide the criteria and any decision making trigger points.

Pages 4-8 thru 4-13 Surface Water Quality and Quantity Options

60 **Ecology Comment:** Will Tacoma work with USACOE and provide assurances for mandatory curtailment on any of the options? How will this be tracked?

61 **Ecology Comment:** Tacoma has a claim for a first diversion water right which has been exercised before the flows under Chapter 173-509 WAC were established. Tacoma should also provide a scenario where instream flows are being met and what that impact on Tacoma's customers will be.

Page 4-173 "The majority of WRIA 9 is composed of Forestland (63%) (Figure 4-17). However, approximately 25 percent of the basin is developed; developed areas are concentrated in the lower basin downstream of Howard Hanson Dam and the Tacoma

Diversion Headworks...16 percent of the fishbearing streams occur on Developed Lands...

62 **Ecology Comment:** Tacoma and the federal government needs to work with other land owners to ensure that current and future land use activities do not continue to have an adverse impact on the water resource and water quality and the fisheries resource.

Comments on the Proposed Habitat Conservation Plan

Page 1-7 "...Tacoma will also amend its water rights to incorporate the higher instream flows previously agreed to with the Muckleshoot Indian Tribe in a 1995 settlement agreement..."

63 **Ecology Comment**: Ecology has not yet received any formal applications to amend the instream flow rules or to provide additional water to the proposed hatchery.

Page 2-8 "Plum Creek Timber Company has developed an HCP for its lands...state lands."

64 **Ecology Comment:** There are multiple projects, which all have an impact on the water resource and water quality. Ecology cannot make a thorough evaluation on the water resource for the upper watershed unless all the plans are submitted.

Page 2-15 "One of the essential elements of the HCP is its monitoring and adaptive management framework...ensure that management strategies and decision making are based on sound scientific principles."

65 **Ecology Comment:** How will Tacoma and the federal agencies work with state agencies if the fish and/or water resource show a declining trend?

Page 2-19 "A portion of the water to be withdrawn from the Green River by Tacoma will be made...but none will be withdrawn by Tacoma Water to meet municipal water supply needs."

66 **Ecology Comment:** The U.S. Army Corps of Engineers proposes to increase its storage of water at Howard Hanson Dam as well as the release stored water for uses beyond its original intent. Ecology believes that a reservoir permit may be needed for the storage and that a secondary permit for flow management may also be needed.

Page 3-3 "The uncertainty problem is the subject of "No Surprises," formerly a U.S Fish and..."

67 **Ecology Comment:** Ecology would prefer to see language where adaptive management is used to benefit the resource as new information through monitoring, studies, or science becomes available. Ecology would like to know the federal government's planned actions when the fish or the public's water resource are showing trends towards degradation? Also, how will the federal government, over the fifty-year time period, assure that the HCP activities and studies are being complied with?

Page 3-9 "Howard Hanson Dam is currently operated to provide flood control.... Dam is altered by a natural occurrence (e.g. earthquake), accident, or act of war, courts, Tacoma will only be obligated to fulfill the provisions of the HCP to the extent it is capable of under the changed...supply of water."

68 **Ecology Comment:** Ecology believes that a reservoir permit may be needed for the additional municipal water stored behind HHD. Ecology and other state and federal agencies will need to formally be made aware within a reasonable period of time, that a force majure event has occurred. Ecology will need to be told of the event, anticipated actions with a timeline by Tacoma or the USACOE to respond to these actions

Page 3-10 "New Listings of Species Not Covered by the ITP."

69 **Ecology Comment:** What will the federal government do if Tacoma decides not to amend its HCP and there is evidence of decline to the species/habitat? Will National Marine Fisheries or the U.S. Fish and Wildlife Service apply the 4(d) criteria and consequences irregardless of the agreed to HCP for the other species?

Page 3-14 "Section 3.3.3 Clean Water Act (CWA). The HCP acknowledges that ESA and CWA need to be coordinated and that Tacoma's management under this HCP is expected to meet or exceed the requirements of the CWA. Tacoma also intends to cooperate with Ecology during Total Maximum Daily Loads (TMDL) studies of the Green River.

70 **Ecology Comment:** Many of the activities and management techniques described by the HCP address water quality concerns, but if these controls are not adequate to provide compliance with water quality standards, then the Department of Ecology is required to impose additional controls. We would like to note that this HCP is limited to activities on the land controlled by Tacoma Water. Since a TMDL applies to a drainage basin or river system and would address all activities by all parties that affect the water quality parameters of concern this HCP can not substitute for a TMDL.

Page 4-9. "Section 4.1.3.1 of the HCP discusses temperature in the Green River. It says, "inflows into the HHD reservoir did exceed 60..." degrees Fahrenheit. The second paragraph of that section says that the temperature of water released from HHD later in the summer has a higher temperature than would be expected under a natural, unimpounded flow. The section goes on to note that various sections of the Green River are listed on the State's 303d list for exceeding state water quality standards for temperature."

71 **Ecology Comment:** The HHD reservoir stores thermal energy in larger quantities than would a natural channel because it exposes more water surface to solar radiation and has less shade than would a natural, unimpeded river. Tacoma Water's water diversion may also influence downstream temperatures. A TMDL addressing excessive water
72 temperatures in the Green River system may require additional controls on Tacoma Water in the future. Are these elevated temperatures attributable to past or present forest
73 management activities by Tacoma Water? Does Tacoma Water expect these temperature excursions to decrease as riparian protection measures provide shade in the upper
74 watershed? These considerations are significant for a river listed on the State 303d list for excessive temperature.

Page 4-42 "Howard Hanson Dam is currently operated under congressional legislation to provide flood control and low flow augmentation..."

75 **Ecology Comment:** The storing of additional public water beyond the confines of the original federal project for numerous new and existing purposes may need a reservoir permit. The releasing of those flows may also need a water right.

Page 4-45 "The current springtime operating strategy of HHD reflects the authorized project purposes of flood control and water storage for low flow augmentation. The USACE has also responded to flow management requests from recreational groups and local communities..."

76 **Ecology Comment:** Ecology believes that a reservoir permit may be needed and that the releasing of the stored public water may also need a water right. Since the USACOE has released public water to varying requests, Ecology will need for its evaluation, the criteria for when the USACOE stores and provides public water for varying purposes.

Page 4-69 "...Peak stream flows occur during the winter and spring months as rainfall and snow melt runoff..."

77 **Ecology Comment:** Also, included in achieving the peak stream flow is the runoff as a result of land use practices in the upper watershed.

Page 4-72 "Tacoma's FDWRC, which provides for water withdrawals for up to 113 cfs, is not constrained by Washington State minimum instream flow requirements..."

78 **Ecology Comment:** Ecology encourages Tacoma to provide its annual consumptive amount with its FDWRC.

79 Ecology would also prefer to have the following language added to the end of the sentence, "because its claim predates when Ecology issued rules for instream flow requirements."

Page 4-77 "There are several hatchery facilities located and operating within the Green River system, and another is planned as part of the MIT/TPU Agreement."

80 **Ecology Comment**: Ecology is aware that additional water rights are desired with this planned hatchery. Ecology has not yet received a water right application for this hatchery.

Page 5-13 "Wet, average, dry, and drought...Tacoma will have the option to lower the minimum flow requirement to 225 cfs at the Auburn gage during drought conditions. "

81 **Ecology Comment:** The Department of Ecology under Chapter 43.83B has the authority to set rules and work with purveyors on interim actions for a drought condition. Any rule making procedure needs to go through public review.

Page 5-13 "...Tacoma will reduce its withdrawal to help prevent a premature drawdown of its reservoir by the USACE. However, thirty days prior to any reduction, Tacoma will convene a drought coordination meeting with the MIT, local, state and federal resource agencies, and USACE to discuss alternatives and seek to institute "consensus derived" derived water use restrictions.

82 **Ecology Comment:** Tacoma needs to have curtailment options in place with an implementation strategy. They should be described here as well as Tacoma's Water System Plan. Ecology is pleased that Tacoma is willing to work with agencies and tribes on managing the resource. Thirty days may not be adequate if the decision needs to be based on a consensus.

Page 5-19 HCM 1-02 Seasonal Restrictions on the Second Diversion Water Right.

83 **Ecology Comment:** Ecology will need to make an evaluation when adding the MIT/TPU flows and trigger points into the permit for the second diversion water right. Any

83 requirements and conditions that Ecology may add or alter are not only limited to Tacoma, but to any other entities whom Tacoma will supply water with through this water right.

Page 5-31thru 5-32 "HCM 2-02 Howard Hanson Dam Non-Dedicated Storage and Flow Management Strategy"

84 **Ecology Comment:** Ecology has asserted that a reservoir permit may be needed and that the releasing of the stored public water also may need a water right. Since the USACOE has released public water to varying requests, Ecology will need, in its evaluation, the criteria for when the USACOE stores and provides public water for varying interests

Page 5-81 HCM 3-01E "Stands in the conservation Zone and Commercial Zone ...may be converted to conifers by clearcutting the existing trees and replanting with conifers as specified in the reforestation HCM.

85 **Ecology Comment:** This HCM results in replacing a riparian area that is presently hardwood dominated (alder and cottonwood) with a conifer area. Clearcut and replant is not necessarily the best way to achieve the desired outcome (conifer area suitable for timber harvest) but it is the most economic way. We would suggest that this HCM be modified to implement other harvest measures should total hardwood conversion be detrimental to other HCM goals and outcomes.

Page 6-4 "Tacoma may modify implementation of the HCP, if requested by the NMFS and USFWS, based on the results of the research measures. Tacoma may also modify the implementation of the HCP, if requested by NMFS and USFWS, based on the consensus of the USACE and the Green River Flow Management Committee...cannot preclude or restrict Tacoma's ability to withdraw water to an extent greater than that agreed to as part of HCMs 1-01 and 1-02 in Chapter 5 of the HCP."

86 **Ecology Comment:** 1. Will Tacoma be willing to modify the agreement or if the Green River Flow Committee or any other entity requests Tacoma to, based on scientific information, new state law, a TMDL listing, or a new listed species? 2. Please provide what entities will have membership on the committee? How will the committee make decisions?

Page 6-10 "While decisions regarding the operation of Howard Hanson Dam are ultimately the responsibility of the USACOE and the federal agencies (through Section 7 consultation), Tacoma believes that establishment of Green River Basin coordinating committee would enhance the synergistic benefits of conservation measures identified in

Chapter 5. However, the establishment of such a committee is not the responsibility of Tacoma, and is therefore beyond the scope of this HCP..."

87 **Ecology Comment:** Ecology agrees that a coordinating committee would enhance the synergistic benefits of conservation measures. Ecology believes that this committee can also provide a collaborative approach to address land use activities in the upper watershed and how the land use effects the resource, whether water resource, water quality, fisheries, or habitat. Ecology believes the responsibility and the solution lies with all the landowners and affected agencies.

Page 6-12 "...Monitoring data will be maintained by Tacoma, and will be made available to the Services upon request...."

88 **Ecology Comment:** Ecology would also like to have certain monitoring data made available upon our request, especially if it relates in instream flow monitoring, HHD Storage and Flow Management, bypass monitoring as it relates to flows, upper watershed and shoreline monitoring, , precipitation with snowpack monitoring, any forest management and road maintenance monitoring.

Page 6-25 "...Tacoma shall ensure instream flow levels are measured....under the conditions specified in the MIT/TPU Agreement..."

89 **Ecology Comment:** Ecology has not yet received any formal applications to amend the instream flow rules.

Page 6-25 "Tacoma will make the results of the above monitoring available to the MIT and interested federal and state resource agencies....and river conditions."

90 **Ecology Comment:** Ecology would like any monitoring information and relevant data available upon request.

<u>General Comments</u>:

91 **Ecology Comment:** Our review of the HCP did not find any discussion relative to management and maintenance practices of the HHD of sediments, which accumulate behind the dam. Although management and maintenance of HHD is done by Army Corps of Engineers, Department of Ecology needs to know if present management and maintenance activities at the dam conform with the state's water quality standards (WAC 173-201A), particularly the standards for turbidity. Any changes that this proposed project would have on those management and maintenance practices and whether or not these changes in management and maintenance practices would comply with the state's

water quality standards. The Department of Ecology was very encouraged to hear recently from TPU officials that TPU is negotiating an Operations Agreement with
92 ACOE on the HHD, which may address many of these water quality concerns. It is Department of Ecology's understanding that this Operations Agreement will be incorporated into the HCP.

Ecology Comment: The sections of the HCP relating to forest management in the upper watershed appear to meet or exceed the requirements of the State's Forest and Fish Rules
93 in effect prior to March 20, 2000. As the rules evolve, Tacoma Water will be required to comply with standards for riparian areas, road construction and maintenance, and other DNR regulations even if they are more stringent than the management activities described in the HCP. There remains a need to develop a mechanism whereby Ecology
94 can make unannounced inspections of TPU and other landowners in the watershed for compliance with forest practices.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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U.S. FISH & WILDLIFE SERVICE
WESTERN WA OFFICE
JAN 09 2000
LACEY, WA
RECEIVED

March 6, 2000

Tim Romanski
US Fish and Wildlife Service
510 Desmond Dr SE, STE 102
Lacey WA 98503-1263

Dear Mr. Romanski:

Thank you for the opportunity to comment on the draft environmental impact statement (EIS) for the Tacoma Water Green River Water Supply Operations and Watershed Protection Habitat Conservation Plan. Our staff has been reviewing the draft EIS.

1 Due to the size of the draft EIS and the complexity of the issue, we request a 14-day extension to the comment period. Please contact me as soon as possible, as to whether our request may be granted, so that we may better coordinate our review and response. I can be reached at (360) 407-7448.

We greatly appreciate your consideration of our request.

Sincerely,

Rebecca J. Inman

Rebecca J. Inman
Environmental Review Section

RI:
EIS #000246

cc: Janet Thompson, NWRO

4.6 STATE AGENCY COMMENT LETTERS

Comment Responses to Washington Department of Fish and Wildlife (STA 1)

STA 1-1
Comment noted.

STA 1-2
Inundation of channels upstream of Howard Hanson Dam will occur as a result of actions by the USACE and is beyond the scope of this HCP. See General Comment Response 12.

Maps depicting the old and new inundation zones and a description of the length and quality of habitat that will be inundated are provided in the Appendix F of the DEIS prepared for the Additional Water Storage Project (U.S. Army Corps of Engineers 1998).

STA 1-3
See Specific Comment Response STA 1-2.

STA 1-4
A report prepared by the USFWS in 1991 clearly describes the quality of riverine habitat in the existing Howard Hanson Dam inundation pool and acknowledges that such conditions are also expected to develop in the newly inundated reaches (Wunderlich and Toal 1992). Habitat restoration projects to be implemented in the new inundation pool as part of Tacoma Water's HCP are intended primarily to reduce the propensity for bank erosion of inundated reaches at low pool levels, and to provide cover for fish occupying or moving through those areas at both full summer conservation pool and winter run-of-river conditions.

STA 1-5
Comment noted.

All major roads, railroads, and utility corridors in the upper watershed are illustrated on the large-scale maps included in the HCP (Figures 4-5 and 5-4) and DEIS (Figures 2-5 and 3-1).

The presence of both the railroad and powerlines is noted in subsection 3.3.2 of the DEIS. It is true that some of these utility and transportation corridors are located within, or adjacent to, the floodplain of the Green River; however, most are outside the jurisdiction of Tacoma Water and the Services. Those roads owned and maintained by Tacoma Water in the upper watershed are covered by the HCP, and are subject to the road maintenance measures contained in the HCP.

STA 1-6

According to the Riparian Condition Assessment contained in the Lester Watershed Analysis (Plum Creek Timber Company 1996), the railroad has reduced riparian shade along the upper mainstem Green River.

STA 1-7

Recruitment of large woody debris to the upper mainstem Green River is limited in locations where roads or railroad rights-of-way are located within 200 feet of the river.

STA 1-8

Approximately 6.3 miles (26%) of the unconstrained mainstem Green River above RM 69 are constrained by roads or railroads adjacent to the stream channel and cannot occupy all of its former floodplain (WRIA 9 Factors of Decline Subcommittee and Washington Conservation Commission 2000).

STA 1-9

There are currently no specific data on access to wall base springs and side channels by juvenile coho. However, the Fish Habitat Assessment Report contained in the Lester Watershed Analysis indicated that off-channel refuge areas are common (Plum Creek Timber Company 1996).

STA 1-10

The proposed up- and downstream fish passage facilities in the HCP will provide anadromous fish access to habitats in the Upper Green River Watershed currently inaccessible to adult salmon. While upper watershed habitats have been affected to various degrees by forestry and transportation activities, reestablishing access to upper watershed habitats provides the opportunity to extend the current range of anadromous fish production in the Green River basin. In their biological opinions, the Services will assess whether the conservation measures in the

HCP represent a credible contribution to the protection of species covered by Tacoma Water's HCP.

The habitat restoration measures proposed under Tacoma's HCP represent a subset of habitat restoration activities to be funded jointly by Tacoma and the USACE as part of the proposed Additional Water Storage Project. The projects included as measures under the HCP are focused on the mainstem because that is where the majority of Tacoma's lands are located. The conservation measures in the HCP include a number of projects designed to increase the availability and complexity of off-channel habitats including reconnection and rehabilitation of Signani Slough (HCM 2-07 Side Channel Reconnection-Signani Slough), excavation of relict side channels or beaded ponds upstream of the inundation zone in the floodplain of the mainstem Green River and selected tributaries (HCM 2-10, Headwater Stream Rehabilitation), and excavation of off-channel ponds and dendrites in the newly inundated portions of the mainstem and several tributaries (HCM 2-03, Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Measures). Expansion of riparian buffers (HCM 3-02, Riparian Management Measures) will allow riparian forests to mature, facilitating reestablishment of natural floodplain processes.

As part of the Additional Water Storage Project, Tacoma will also help fund additional habitat rehabilitation projects aimed at restoring off-channel habitats, including the reconnection of several former side channels near Palmer (U.S. Army Corps of Engineers 1998). These projects were not included as part of the HCP as they are not located on lands owned by Tacoma.

Finally, individuals responsible for planning of the Additional Water Storage Project and the USACE Green Duwamish Ecosystem Restoration Project have been working collaboratively to identify both in-channel and off-channel habitat rehabilitation projects that will benefit aquatic species in the Green River. The Services anticipate that the close coordination between Tacoma, the USACE, and King County regarding the various proposed ecosystem restoration and habitat rehabilitation projects will be sufficient to ensure that specific rehabilitation activities conducted under each project contribute to the overall restoration of aquatic habitat in the Green River basin.

STA 1-11

See Specific Comment Responses STA 1-2 and STA 1-10.

STA 1 -12

The new DNR Forests and Fish Emergency Rules (effective 20 March 2000) supersede existing Watershed Analysis riparian prescriptions; no new riparian prescriptions will be written. Mass wasting and surface erosion modules will continue to be part of Watershed Analysis, providing prescriptions for reducing potential damage to public resources. See Specific Comment Response STA 1-13.

STA 1-13

Tacoma Water has committed to participate in Watershed Analyses (HCM 3-03A) and to utilize prescriptions developed from these analyses. If formal Watershed Analyses are not completed in a specified time period, Tacoma Water would conduct comparable analyses to develop prescriptions specific to its lands (HCM 3-01N, HCM 3-03B, and HCM 3-03C).

Even if Watershed Analyses are no longer conducted under state regulations, Tacoma Water would still be obligated to complete such analyses as specified in the HCP. Tacoma Water would continue to abide by the current Forest Practices Rules, although in most situations we believe the HCP measures would exceed these rules.

STA 1-14

The HCP commitment to the Washington Forest Practices Board Watershed Analysis process means that the assessment reports and prescriptions must be completed and reviewed every 5 years. Under the terms of the ITP, this review would occur even if the mass wasting module and prescription processes are discontinued at the state level.

Compliance Monitoring Measures CMM-12 and CMM-14 formalize Tacoma Water's commitment to update maps of the Mass Wasting Map Units, evaluate the adequacy of slope stability analyses, and identify whether sediment reduction targets are met (subsections 6.1.12 and 6.1.14). Tacoma Water's ongoing commitment to the Watershed Analysis process complements similar commitments by other major landowners in the upper Green River basin (Plum Creek Timber Company 1996; U.S. Forest Service 1996), even if Watershed Analysis is

no longer required by state Forest Practices Rules. The Services believe that such an approach would provide an excellent means of assessing the effectiveness of mass wasting prescriptions and of facilitating adaptive management.

STA 1-15

The commenter did not provide sufficient information to allow for a specific response. Impacts and benefits were both quantified using the same analysis techniques to ensure consistent, objective evaluation of the effects of the Proposed Action.

STA 1-16

The intent of the comment is unclear. The HCP instream flow impact analyses used the results of a study conducted by Ecology and approved by staff from the Washington Department of Fisheries and Washington Department of Wildlife (Caldwell and Hirschey 1989). The IFIM is a tool used in determining instream flow requirements, and as such has inherent strengths and weaknesses. The IFIM continues to be the method generally used by Ecology and the WDFW, as well as the Services, to assess instream flow requirements.

Studies of juvenile salmonid instream migration, side channel connectivity, and steelhead incubation were also conducted to supplement the results of Ecology's instream flow study. The impact analyses quantified the availability of habitats with and without Tacoma's withdrawals to fully describe the effects of the Proposed Action.

STA 1-17

The Services agree that minimum flows would not, by themselves, provide adequate protection for aquatic resources in the Green River Watershed. Therefore, Tacoma has proposed a variety of aquatic resource protection measures in addition to instream flow requirements. These additional measures include upstream and downstream fish passage, sediment and large woody debris transport, and rehabilitation of off-channel habitats.

The level of protection provided by the HCP is a combination of instream, riparian, and upland conservation measures. These measures are intended, to the maximum extent practicable, to minimize and mitigate the impacts of any take. Incidental take that is permitted under the HCP would not appreciably reduce the likelihood of survival and recovery of the species in the wild.

STA 1-18

Comment noted.

STA 1-19

In response to this comment, Tacoma distributed a letter on 3 March 2000 clarifying text in HCM 1-02, Seasonal Restriction on the Second Diversion Water Right. The contents of the letter are as follows (City of Tacoma 2000):

> "The purpose of this memo is to clarify the commitments made in Habitat Conservation Measure 1-02 in Tacoma Water's Green River Habitat Conservation Plan (HCP). A reviewer brought to our attention that wording in the document may be misinterpreted. The wording will be clarified in the final edition of the HCP.
>
> Tacoma Water's intended commitment under Habitat Conservation Measure (HCM) 1-02 is as follows:
>
> Tacoma Water's ability to divert its Second Diversion Water Right from the Green River is restricted by the City's 1995 agreement with the Muckleshoot Indian Tribe. That agreement establishes minimum instream flows at both the Palmer and Auburn gauges on the Green River. When flows at either gauge are below the minimum flow levels stated in HCM 1-02, Tacoma Water cannot divert water under its Second Diversion Water Right.
>
> Tacoma Water intends to divert its Second Diversion Water Right to storage behind Howard Hanson Dam under the Additional Water Storage Project between February 15 and the point when either 20,000 acre-feet have been stored, or when stream flows reach the thresholds specified by HCM 1-02. When Green River flows are below the flow thresholds, and Tacoma Water cannot divert water under its Second Diversion Water Right, the stored water would be used for municipal supply."

STA 1-20

See Specific Comment Response STA 1-19.

STA 1-21

See Specific Comment Response STA 1-19.

STA 1-22

As described in HCP subsection 7.0, Impact Analysis Procedures, the downstream effects of Tacoma's exercise of its Second Diversion Water Right during spring storage were assumed to be a Tacoma action because the water was diverted to storage for future municipal use. When water is being stored behind Howard Hanson Dam at a rate of 100 cfs for municipal use, Tacoma cannot simultaneously withdraw water under its Second Diversion Water Right at its Headworks.

In the impact analysis model, the downstream effects of Tacoma's exercise of its Second Diversion Water Right occurred during the springtime, as water was diverted to storage.

The water stored behind Howard Hanson Dam that is dedicated to municipal use is available for use by Tacoma at any time (see HCM 2-02, Howard Hanson Dam Dedicated Storage and Flow Management Strategy). Since the impacts of water withdrawal were assessed when it was diverted to storage, a second impact assessment was unnecessary.

When instream flows during the summer are sufficient to allow Tacoma to exercise its Second Diversion Water Right, the model assumed that Tacoma would withdraw water at its Headworks under the Second Diversion Water Right rather than rely on stored water to meet its municipal water demands. This represents a worst-case scenario as it pertains to impacts to instream resources and was considered an appropriate impact analysis procedure for the HCP and EIS.

STA 1-23

See General Comment Response 26 for a discussion of adaptive management provisions of the HCP, and General Comment Response 17 for a discussion of increasing instream flows to provide additional natural resource protection. Elements of the MIT/TPU Agreement that are critical to the HCP must be implemented to allow ITP issuance.

STA 1-24

See General Comment Response 17.

STA 1-25

See General Comment Responses 13 and 14. Since the draft HCP and DEIS were submitted for comment, the USACE has prepared a Programmatic Biological Assessment addressing ESA Section 7 consultation of continued operation of Howard Hanson Dam and the Additional Water Storage Project. The Services are preparing a Biological Opinion that will help delineate the ESA responsibilities of various parties.

STA 1-26

Comment noted.

STA 1-27

Contrary to the commenter's assertion, the height of Howard Hanson Dam will not be raised as part of the Additional Water Storage Project. Under the Additional Water Storage Project, the summer conservation pool will be increased, while the height, and thus the flood storage capacity, of Howard Hanson Dam will not be changed.

Chapter 2 of the HCP is the Introduction; text on the Additional Water Storage Project presented in subsection 2.3.3.2 is intended to summarize actions specific to that project, particularly actions that are complementary to measures presented in the HCP. Subsection 2.3.3.2 was not intended as a complete analysis of the impacts and benefits of the Additional Water Storage Project. Storage of water behind Howard Hanson Dam is a USACE activity, and the impacts and benefits of that action were addressed in the EIS for the Additional Water Storage Project (U.S. Army Corps of Engineers 1998). See General Comment Response 12.

Impact analyses conducted as part of Tacoma's HCP are presented in Chapter 7, Effects of Tacoma Water Withdrawal and Conservation Measures. Chapter 7 addresses only the impacts and benefits of Tacoma's covered activities, which are listed in HCP subsection 2.6, Activities Covered by the ITP. Storage of water behind Howard Hanson Dam would not be a covered activity under Tacoma's proposed ITP, but is discussed more fully in material that has been added to FEIS subsection 4.12, Cumulative Effects.

STA 1-28

The critical conditions mentioned by the commenter are contained in letters from the NMFS and WDFW to the USACE and Tacoma Water regarding the Additional Water Storage Project. A listing of the six principles and Tacoma's response are contained in Appendix E of the HCP. Tacoma's commitments to those principles were incorporated into various conservation measures within the HCP and specifically identified in the Appendix.

STA 1-29

See Specific Comment Response STA 1-27 and General Comment Response 12.

STA 1-30

See Specific Comment Response STA 1-27 and General Comment Response 12.

STA 1-31

Under extreme low flow conditions, provisions within HCM 1-01, Minimum Instream Flows Under First Diversion Water Right Claim, require Tacoma Water to constrain withdrawals to maintain a flow of at least 225 cfs in the Green River at Auburn between 15 July and 15 September. The HCP guaranteed minimum flow of 225 cfs at Auburn is higher than the minimum 7-day low flow value of 203 cfs modeled for the natural flow regime (see HCP Table 7-1, Selected hydrologic characteristics of flows in the Green River at Auburn under the modeled natural flow regimes for the period 1964 to 1995). The natural flow regime is defined as the absence of Tacoma withdrawals and Howard Hanson Dam but with forestry and land use developments. Regardless of whether low flows under the HCP are slightly higher, lower, or approximately the same as "natural" conditions, the Services agree that low flows have detrimental effects on Green River fisheries resources.

See General Comment Response 26 for a discussion of adaptive management provisions of the HCP, and General Comment Response 17 for a discussion of increasing instream flows to provide additional natural resource protection.

STA 1-32

See General Comment Response 17.

STA 1-33

Under HCM 1-01, Tacoma Water must constrain withdrawals under its First Diversion Water Right claim to maintain the specified minimum flows.

STA 1-34

See Specific Comment Response STA 1-22.

Tacoma Water's ability to divert its Second Diversion Water Right from the Green River is restricted by the City's 1995 agreement with the Muckleshoot Indian Tribe. That agreement establishes minimum instream flows at both the Palmer and Auburn gauges on the Green River. When flows at either gauge are below the minimum flow levels stated in HCM 1-02, Tacoma Water cannot divert water under its Second Diversion Water Right.

Tacoma Water intends to divert its Second Diversion Water Right to storage behind Howard Hanson Dam under the Additional Water Storage Project between 15 February and the point when either 20,000 acre-feet have been stored, or when stream flows reach the thresholds specified by HCM 1-02. When Green River flows are below the flow thresholds, and Tacoma Water cannot divert water under its Second Diversion Water Right, the stored water would be used for municipal supply.

STA 1-35

The trap-and-haul facility and water intake screen at Tacoma's Headworks would be designed to allow woody debris that collects on the screen surfaces to be passed downstream to the channel below the Headworks. Details of the facilities would be developed during final design, however HCMs 1-03 and HCM 1-04 would be modified to require compliance with transport of woody debris.

Large woody debris to be placed upstream of the Headworks under HCM 1-05, Headworks Large Woody Debris Placement, are not intended to function as key pieces; that is, they are not intended to collect and stablize loose woody debris drifting downstream. The intent of large woody debris placement upstream of the Headworks is to provide cover along bank margins during high flows (CH2M Hill et al. 1996). We believe that the proposed measure is adequate to accomplish these goals.

We agree that wood intended to function as key pieces should be scaled to the size of the channel. Where the intent is to place wood that will capture smaller pieces that are transported into the area from upstream reaches, key sized pieces or stable accumulations of wood are most appropriate. However, in the case of HCM 1-05, we feel that there are few sources of large woody debris in the limited area between Howard Hanson Dam and the proposed placement site, thus utilization of key pieces (which might be put to better use elsewhere in the watershed) is not warranted.

STA 1-36

See Specific Comment Response STA 1-35.

STA 1-37

The HCP clearly states that wood placed in the mainstem would be greater than 20 feet long and have a minimum stem diameter of 12 inches. These criteria do not exclude the use of larger logs if such pieces are deemed necessary during development of specific design plans. Wood placed at each site would be sized according to the intended function and channel dimensions. As noted in HCM 1-05, Tacoma Headworks Large Woody Debris/Rootwad Placement, "Structures that are deemed non-functional as a result of high flows will be modified or replaced by Tacoma as needed within the first 5 years following construction." This commitment would ensure that if wood placed initially proves to be too small to remain stable for at least 5 years, then the design would be modified such that structures are of a sufficient size to remain stable. Once it has been determined that the structural design is sufficient to remain stable and functional for at least 5 years, we do not anticipate that structures would need to be replaced more than once over the remaining term of the HCP.

STA 1-38

A formal decision regarding the selection of a single or dual lock outlet structure has not been made. The 35 percent Draft Design Documentation Report for the Howard Hanson Dam, Additional Water Storage Project identified the preferred outlet alternative as a single lock with dual chambers (U.S. Army Corps of Engineers 2000). The selection of a dual-chambered lock will be evaluated at the 35 percent Design Phase, again during the value-engineering review and at the 65 percent Design Phase. State and federal fisheries engineers are involved in the review and selection process.

STA 1-39

Comment noted.

STA 1-40

As previously noted in General Comment Response 12, Howard Hanson Dam is a federal facility operated by the USACE. The storage of water behind Howard Hanson Dam under the Additional Water Storage Project is a federal activity that cannot be covered by the Section 10 ITP being requested by Tacoma Water. An ITP can only be issued to a non-federal entity. Instead, ESA coverage for the Additional Water Storage Project is being pursued by the USACE through the Section 7 process simultaneous with Tacoma's application for an ITP.

Tacoma Water is the local sponsor of the Additional Water Storage Project, and, as such, is responsible for paying a portion of the costs of the project. Tacoma acknowledges its responsibility to participate in mitigating the adverse environmental effects of raising the level of the reservoir during the spring and summer, but the act of storing water behind Howard Hanson Dam is a USACE action to be addressed through the Section 7 ESA process. Should Tacoma, as the local landowner, conduct mitigation activities, the implementation of the mitigation would be covered by Tacoma's ITP.

The Services are coordinating with the USACE during the design of appropriate mitigation for increased reservoir inundation associated with the Additional Water Storage Project. The 35 percent Design Report for fish and wildlife mitigation associated with the Additional Water Storage Project was submitted to the Services for review in July 2000, and we will coordinate with the USACE to ensure proposed measures achieve stated objectives (U.S. Army Corps of Engineers 2000).

As noted in HCM 2-03, Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Measures "Alternate measures will be implemented if any of the above measures are determined to be infeasible or not cost-effective during the final design, or if environmentally superior measures can be implemented at comparable cost. Any alternate measures will have habitat benefits greater than or equal to the measure originally proposed, and will be reviewed and approved in advance by the NMFS and USFWS."

STA 1-41

See Specific Comment Response STA 1-40.

STA 1-42

See Specific Comment Response STA 1-40.

STA 1-43

See Specific Comment Response STA 1-40.

STA 1-44

See Specific Comment Response STA 1-40.

According to a field reconnaissance of the Lester airport site conducted by a USACE fisheries biologist "the newly carved channel is straight, wide, braided, steep and shallow…The stream tends to go subsurface at extreme flows and even at low flow the channel is exposed to maximum solar insolation. The area is totally lacking in shade or any mature riparian vegetation…The historic mainstem channel located on the left side of the floodplain…has a well developed riparian zone on both banks with a resultant narrower active channel" (Goetz 2000). The commenter is correct in noting that the road and airstrip have reduced the area of the former floodplain at the site. However, given the current condition of the river in the area referred to by the commenter, returning the channel to its former course was deemed preferable to allowing it to continue to migrate across an area where the floodplain topography and vegetation have been severely altered (U.S. Army Corps of Engineers 2000).

As noted in HCM 2-03, Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Measures "Alternate measures will be implemented if any of the above measures are determined to be infeasible or not cost-effective during the final design, or if environmentally superior measures can be implemented at comparable cost. Any alternate measures will have habitat benefits greater than or equal to the measure originally proposed, and will be reviewed and approved in advance by the NMFS and USFWS."

STA 1-45

See Specific Comment Response STA 1-40. See also Specific Comment Response STA 1-37 for a further discussion of large woody debris size criteria and stability.

STA 1-46

See Specific Comment Response STA 1-40.

The minimum diameter of each piece of wood used to construct debris jams will be 12 inches at the smallest end of the bole. As noted in Specific Comment Response STA 1-37, size criteria stipulated in HCM 2-03, Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Measures, represent the minimum size of wood that can be used, and do not preclude the use of larger pieces if larger pieces are deemed necessary and are available. Furthermore, by definition, key pieces are logs with a volume sufficient to remain independently stable within the channel. Where conservation measures specifically state that key pieces would be placed, the required size of those pieces would be determined based on tables produced by the Northwest Indian Fisheries Commission (Schuett-Hames et al. 1999) or comparable criteria acceptable to the Services.

STA 1-47

Comment noted.

STA 1-48

See Specific Comment Response STA 1-40.

Unless the text explicitly states otherwise, for the purposes of this HCP, a rootwad was defined as "a dead section of a tree with a recognizable bole and root system and a total length less than the minimum 2.0-meter log length criteria" (Schuett-Hames et al. 1999). As described by Schuett-Hames et al. (1999) the diameter of a rootwad is measured at the base of the bole where it meets the root. This diameter may be substantially greater than the diameter at breast height (dbh).

As noted in Specific Comment Response STA 1-37, the compliance monitoring program is designed to document the stability of large woody debris and structures through a series of at

least five high flow seasons. If structures prove to be unstable, the design or size of wood used would be modified accordingly.

STA 1-49

See Specific Comment Response STA 1-40.

The habitat mitigation projects included as part of Tacoma's HCP were selected because: 1) they are a part of a larger set of projects deemed to provide appropriate mitigation and restoration for the proposed Additional Water Storage Project and 2) they are located on lands owned by Tacoma.

STA 1-50

See Specific Comment Response STA 1-40.

The Services agree that it is preferable to use large, independently stable pieces of wood. The recent 4(d) rule proposed by NMFS states that "Wood placement should rely on the size of wood for stability, and may not use permanent anchoring including rebar or cabling" (50 CFR Part 223). As noted in the HCP text referred to by the commenter, placement of anchored large woody debris would be used only if key sized pieces are unavailable and monitoring indicates that clusters of smaller pieces of wood are unstable. If anchoring is required, the Services expect to work with Tacoma to identify appropriate means of stabilizing large woody debris (e.g., keying into bank, or bracing with boulders).

STA 1-51

See Specific Comment Response STA 1-40.

The USACE has identified a relict side channel located within the lower 0.5 mile of Smay Creek that will be rehabilitated as part of the Additional Water Storage Project mitigation and restoration package.

STA 1-52

The Services believe that retention of standing timber along the reservoir shoreline would provide wildlife and fisheries benefits. During a USFWS study of springtime juvenile salmonid emigration through the Howard Hanson reservoir, significantly more fish were observed near shore than toward mid-reservoir (Dilley 1994). Retention of standing timber in the new inundation zone would provide cover to juvenile salmonids moving downstream along the reservoir shoreline.

STA 1-53

The intent of the proposed downstream fish passage facility is to pass juvenile salmonids downstream of Howard Hanson Dam with minimal delay. If juvenile salmonids rear in the reservoir through the summer, they are expected to pass downstream during the fall when the reservoir is emptied to provide winter flood control storage. During earlier studies, juvenile salmonids exhibited rapid growth when detained behind Howard Hanson Dam due to the lack of a downstream fish passage facility. Dilley and Wunderlich (1993) studied juvenile salmonid movement through Howard Hanson Dam and noted that "chinook subyearlings emigrating from Howard Hanson project in late fall displayed substantial growth, probably due to reservoir rearing." Two years of gill net and trapping studies by USFWS researchers failed to document the presence of warmwater species in the reservoir (Dilley 1994; Dilley and Wunderlich 1993).

See Specific Comment Response STA 1-40 regarding the misconception that Tacoma Water is receiving "credit for inundation zone habitat."

STA 1-54

The HCM 2-05, Juvenile Salmonid Transport and Release, provides for the transportation of juvenile salmonids into the upper watershed if determined to be beneficial to Green River fish runs by the NMFS and USFWS.

STA 1-55

The HCM 2-05, Juvenile Salmonid Transport and Release, provides for the transportation of juvenile salmonids into the upper watershed if such activity is determined to be beneficial to Green River fish runs by the NMFS and USFWS. The transport and release of juvenile salmonids is contingent upon a number of factors, including approval by the Services of the Fish

Restoration Facility and its intended uses. If necessary, permits to operate the Fish Restoration Facility and release of fish into the upper watershed in compliance with the ESA would be sought as a process separate from Tacoma Water's ITP. These actions would undergo NEPA review independent of the HCP.

STA 1-56

Comment noted.

STA 1-57

We agree that the woody debris management program should focus on the largest available wood. As with wood to be placed as part of upper Green River basin habitat rehabilitation measures, the size criteria specified in HCM 2-08, Downstream Woody Debris Management Program, identify the minimum size of wood that would be considered large woody debris, and do not preclude placement of larger pieces if available. The criteria provided in the conservation measure are intended to differentiate pieces that are considered large woody debris from pieces that are considered small woody debris.

Habitat Conservation Measure 2-08 has been modified to clarify that the size distribution of wood passed or placed below the Tacoma Headworks should reflect the largest available pieces rather than be representative of the sizes of wood entering the reservoir. Since the preferred approach is to allow wood to redistribute naturally during high flows, pieces input as part of the Downstream Woody Debris Management Program will consist of a variety of sizes. If wood input under the Large Woody Debris Management Program is required to be anchored, we expect that pieces placed would be chosen from the largest available size classes, and that fewer pieces would be placed than if wood were allowed to be redistributed naturally.

STA 1-58

Comment noted.

The opportunity to adapt the measure in response to the results of monitoring is described in the commitment text box of HCM 2-08.

STA 1-59
See Specific Comment Response TRI 2-51.

STA 1-60
Comment noted.

STA 1-61
Comment noted. See Specific Comment Response TRI 2-51.

STA 1-62
See Specific Comment Response STA 1-40.

STA 1-63
Comment noted.

STA 1-64
See Specific Comment Responses STA 1-6, 1-8, 1-10, and 1-11. Also, see General Comment Response 10.

STA 1-65
The reason there appears to be an information gap on development above Howard Hanson Dam is because there are very few developed sites in the Upper Green River Watershed. Two major developments, North Fork Wellfield and Burlington Northern Santa Fe Railroad, are described in the HCP in subsections 4.2.3 and 4.2.4, respectively. Other developed sites include the Bonneville Power Administration transmission lines, Puget Sound Energy transmissions lines, U.S. West telephone line and a small communication building, two Tacoma-owned houses at Friday Creek, and Tacoma-owned roads described in subsection 7 of the HCP.

STA 1-66
Tacoma has committed to participate in Watershed Analyses performed according to the Washington Forest Practices Board process (HCM 3-03A) and to utilize prescriptions developed through formal Watershed Analyses, or to conduct a comparable analysis to develop prescriptions specific to Tacoma lands if formal Watershed Analyses are not completed in a

specified time period (HCM 3-01N). Since the Washington Forest Practices Board process requires assessment reports and prescriptions to be periodically reviewed, the commitment to the process as part of the HCP means that the assessment reports and prescriptions must be completed and reviewed as specified every 5 years. This review would occur even if the mass wasting module and prescription processes are discontinued at the state level.

Compliance Monitoring Measures CMM-12 and CMM-14 formalize Tacoma's commitment to update maps of the mass wasting map units, evaluate the adequacy of slope stability analyses, and identify whether sediment reduction targets are met (subsections 6.1.12 and 6.1.14). Tacoma's ongoing commitment to the Watershed Analysis process complements similar commitments by other major landowners in the upper Green River basin (Plum Creek Timber Company 1996; U.S. Forest Service 1996), even if it is no longer required by state Forest Practices Rules. We believe that such an approach would provide an excellent means of assessing the effectiveness of mass wasting prescriptions and facilitate adaptive management.

STA 1-67

It would not be practicable to identify a target road density or to estimate the length of road that can be abandoned without first conducting a comprehensive road inventory and then developing a transportation plan. Tacoma Water has committed to completing such an inventory and plan under its HCP, and is currently working to complete those tasks in cooperation with other basin landowners through Watershed Analysis (HCM 3-03B). Use and maintenance of many of the roads on Tacoma's lands in the Upper Green River Watershed are governed by legally binding easements and rights-of-way agreements. Consequently, a cooperative approach like that implemented through the Watershed Analysis process is considered the best and most efficient means of developing effective road abandonment plans.

STA 1-68

We agree that gravel retention in the Green River is an important issue. The DEIS discussion referred to by the commenter is not meant to provide an exhaustive analysis of the current Green River conditions. Current sediment and large woody debris transport processes are discussed in HCP subsection 4.5.3. Complete analyses of the anticipated effects of implementing the HCP with regard to the quality and quantity of aquatic habitat are provided in HCP subsections 7.1 through 7.10.

The discussion referred to by the commenter briefly summarizes the general anticipated effects of implementing the HCP on gravel and wood transport to provide a context for the proposed monitoring measures. We assume that simultaneously enhancing both large woody debris and gravel recruitment downstream of the Headworks Dam would help restore fluvial geomorphic processes, including gravel transport and retention. However, HCM 2-08 expressly identifies installation of gravel retention structures as an option under adaptive management if monitoring indicates gravel retention structures are necessary.

STA 1-69

As noted in HCP Chapter 6, Monitoring and Research Program, Tacoma Water has agreed to fund solely or jointly (in conjunction with the USACE and other federal agencies) a variety of monitoring and research measures. The measures have been subdivided into three major types: 1) compliance monitoring to ensure conservation measures are implemented according to specified standards; 2) effectiveness monitoring to provide feedback to improve performance and functionality of measures where Tacoma Water is responsible for ensuring results; and 3) research designed to provide resource agencies and the Muckleshoot Indian Tribe information needed to adaptively manage natural resources of the Green River on a real-time basis to address the needs of the fish resource.

The commenter correctly notes that under Compliance Monitoring Measure (CMM)-01, Minimum Instream Flow Monitoring, Tacoma Water would report on its compliance with minimum flow levels identified in HCM 1-01 and HCM 1-02. Minimum instream flow levels identified in the MIT/TPU Agreement were developed using the results of Ecology's instream flow study and professional judgment of Muckleshoot Indian Tribe and Tacoma Public Utility biologists and managers. These flow levels are higher than minimum instream flows established by the state to protect fish and other instream resources. In addition, under CMM-02, Howard Hanson Dam Non-Dedicated Water Storage and Flow Management Monitoring, Tacoma Water would provide funding support to the USACE to publicly distribute data on the quantity of water stored in non-dedicated, dedicated water supply, and dedicated flow management blocks. The Green River Flow Management Committee would use these real-time data to recommend in-season flow adjustments.

As described in HCP subsection 6.3, Research Monitoring, Tacoma Water has committed to conservation measures where Muckleshoot Indian Tribe and resource agencies would be provided the opportunity to identify and recommend adaptive management options with the approval of the NMFS and USFWS (e.g., springtime refill at Howard Hanson Dam). For conservation measures where Muckleshoot Indian Tribe and agencies are responsible for adaptively managing a resource, Tacoma has committed to funding research to provide feedback on the results of Muckleshoot Indian Tribe and resource agency actions. A summary of the research measures is described in HCP Table 6-3, Tacoma's Green River HCP Commitments in Support of Research. Research would be funded throughout the 50-year term of the ITP as described in HCP Table 8-2, Estimated Costs for Research and Adaptive Management.

STA 1-70

The commenter correctly notes that Tacoma Water has included elements of the 1995 MIT/TPU Agreement as conservation measures within its HCP. If an ITP is issued, Tacoma Water would be required to implement those conservation measures for its activities to be in compliance with the ESA.

As noted in subsection 11.1 of the 1995 MIT/TPU Agreement, the full Agreement goes into effect when Tacoma obtains construction financing for the Second Supply Project. The Second Supply Project includes construction of a new water intake and pipeline since Tacoma Water's existing facilities are insufficient to allow it to fully exercise its Second Diversion Water Right. The Services expect that Tacoma Water would quickly pursue completion of the Second Supply Project if an ITP is issued, and that Tacoma Water would fully implement the 1995 MIT/TPU Agreement prior to exercising its Second Diversion Water Right. As far as the Services can discern, Tacoma has fully complied with the terms of the Agreement that are in effect until construction financing is obtained (see Specific Comment Response TRI 2-67).

STA 1-71

This comment pertains to CMM-12 in HCP Table 6-1. Under the subheading of "Hardwood Conversion" in Table 6-1, it is stated that such units would undergo a single inspection 1 year after harvest. The intent of this inspection is to verify that harvest units have been replanted with 300 to 400 seedlings per acre as required in HCM 3-01M. It is true that the ultimate success of some hardwood conversions may require repeated inspections and intermediate silvicultural

operations, but such activities are required under Washington Forest Practices Rules (WAC 222-34-010), and therefore are not included as an HCP measure. Tacoma Water's obligation to comply with the Forest Practices Rules would not cease under the HCP.

STA 1-72

Habitat Conservation Measure 2-06, Low Flow Augmentation, provides for up to 5,000 acre-feet of summer conservation storage to augment flows to benefit fisheries resources. The 5,000 acre-feet of water would be in addition to the 24,200 acre-feet of water currently stored for low flow augmentation. The additional flow could be used to increase early summer flows to protect steelhead egg incubation, or to provide supplemental freshets during late summer to benefit adult salmon migration. Input of the Green River Flow Management Committee will be considered prior to the actual use of the up to 5,000 acre-feet of additional storage. See General Comment Response 17 regarding additional instream flows to increase aquatic resource protection.

STA 1-73

The Services acknowledge that in the past, steelhead eggs deposited in April or May were often subject to greater risk of desiccation than eggs deposited in June. The HCP analyses of steelhead incubation forecasted the effects of proposed flow changes, and did not quantify past impacts of Howard Hanson Dam operations. Using a 32-year record of daily flows, proposed Tacoma Water withdrawals and USACE operation of Howard Hanson Dam were predicted to impact the incubation of steelhead eggs deposited in June more than eggs deposited in April and May. These analyses did not take into account the number of spawners in each month, but quantified potential egg desiccation due to redd dewatering. The analyses also did not assume that water stored under HCM 2-06, Low Flow Augmentation, would be used to augment flows in July during average and wet years, which are periods of greatest risk to steelhead redd dewatering. Annual monitoring of steelhead spawning and incubation (Research Funding Measure [RFM] 02B) will help identify the timing and depth of spawning steelhead and provide the Green River Flow Management Committee with real-time data to support flow management recommendations.

STA 1-74

See Specific Comment Response STA 1-19.

STA 1-75

As the commenter acknowledges, several of the weaknesses of the IFIM used by Ecology to assess Green River instream flows are discussed in HCP subsection 7.1.3.2, Potential Effects of Covered Activities and Conservation Measures on Chinook Spawning and Incubation. The IFIM does not adequately address the issue that chinook salmon redds constructed during periods of high flow are more susceptible to dewatering than redds constructed when Green River flows are low, which have a higher chance of remaining wetted through the incubation period. Conversely, chinook spawning during periods of low flow may result in the concentration of redds near the center of the channel; these redds are susceptible to destruction by bed movement during flood events. Although the HCP analyses used the results of Ecology's IFIM to assess the effects of water withdrawals on mainstem spawning habitats, Tacoma Water also conducted separate analyses of chinook incubation conditions and side channel habitats during the chinook fall spawning period.

The Services acknowledge that Tacoma Water's withdrawals decrease available chinook spawning habitat in the Middle and Lower Green River. Efforts to minimize the effects of the withdrawals include HCM 1-02, Seasonal Restrictions, on the Second Diversion Water Right and HCM 2-06, Low Flow Augmentation. Efforts to further protect chinook spawning habitat in the Green River below Tacoma's Headworks include HCM 2-09, Mainstem Gravel Nourishment, HCM 2-08, Downstream Woody Debris Management Program, and HCM 2-07, Side Channel Reconnection-Signani Slough. In addition, Tacoma has committed to providing upstream and downstream fish passage and upper watershed rehabilitation measures that would allow chinook salmon the opportunity to extend their current range of available spawning habitat.

STA 1-76

See Specific Comment Response STA 1-75.

STA 1-77

Comment noted. Similar to the analyses conducted for chinook salmon, Tacoma Water expanded its analyses of the effects of water withdrawals on steelhead spawning and incubation beyond Ecology's IFIM. While the results of Ecology's instream flow study indicated that Tacoma Water's withdrawals increase available spawning habitat, analyses of steelhead

incubation conditions and side channel habitats indicated that Tacoma's withdrawals would increase the potential for steelhead redd dewatering. Efforts to minimize detrimental effects of the withdrawals included HCM 1-02, Seasonal Restrictions on the Second Diversion Water Right, and HCM 2-06, Low Flow Augmentation. Efforts to further protect steelhead-spawning habitat in the Middle and Lower Green River included HCM 2-09, Mainstem Gravel Nourishment, HCM 2-08, Downstream Woody Debris Management Program, and HCM 2-07, Side Channel Reconnection-Signani Slough. In addition, and perhaps more importantly, Tacoma Water has committed to providing upstream and downstream fish passage and upper watershed rehabilitation measures that would allow steelhead the opportunity to extend their current range of available spawning habitat.

STA 1-78

The Services recognize that the use of a 50-day incubation period as a modeling assumption may, in some years, underestimate the impact of Green River water withdrawals on steelhead spawning. However, the 50-day incubation assumption was consistently used to describe and compare both impacts and benefits of different water withdrawal alternatives on steelhead eggs. Conservation measures were developed assuming the flow regime proposed in the HCP resulted in a net impact to steelhead incubation.

STA 1-79

The HCP analyses of steelhead spawning and incubation conditions calculated that dewatered spawnable channel width would increase by 0.4 feet under Tacoma's proposed water withdrawals. This impact represents a small portion of the 140- to 150-foot-wide channel. The commenter notes, however, that steelhead spawning is concentrated along the stream margins. Assuming that steelhead spawn only within a 10-foot-wide band along each channel margin, the increase of 0.4 feet of dewatered spawnable width represents a 2 percent loss. The Services will review the implications of these and other steelhead modeling assumptions when preparing the Biological Opinion prior to an ITP issuance decision.

STA 1-80

See Specific Comment Response TRI 2-51.

STA 1-81

The section in the HCP referenced by the commenter (HCP subsection 7.7.4.2) states:

> "The analysis indicates that Tacoma's withdrawals (both FDWC and SDWR) will result in an average 7.9 percent increase in juvenile steelhead *habitat* in the mainstem middle Green River (Table 7-29) during their year-round rearing period. Flows in the middle Green River are typically higher than those considered to be optimal for juvenile steelhead (350 to 400 cfs) by Ecology's instream flow study (Caldwell and Hirschey 1989), except during low flow periods in the late summer and early fall. During these low flow periods, juvenile steelhead *habitat* values are sustained at relatively high levels (i.e., > 90 percent of optimal) by the minimum flow measures that have been established by the MIT/TPU Agreement" (*emphasis added*).

It appears that the commenter assumed that high habitat values correspond to high flows. In contrast, Ecology's instream flow study found that potential habitat values for juvenile steelhead increased as flows drop to 400 cfs (Caldwell and Hirschey 1989), and this finding is reflected in HCP Chapter 7.

The HCP Chapter 7 analyses did not depend on a natural flow regime to evaluate alternatives; however, natural flows were used as a qualitative check on the effects of the proposed conservation measures (see General Comment Response 27 for a discussion of the natural flow regime).

STA 1-82

See Specific Comment Response TRI 2-81.

STA 1-83

Comment noted.

STA 1-84

Comment noted.

STA 1-85

Comment noted.

STA 1-86

It is neither a requirement of the ESA, nor an objective of the Tacoma Water HCP, to maintain target populations of Covered Species in the upper watershed. Rather, the objective of the HCP is to provide habitat for the Covered Species at a level that is both practicable and commensurate with the anticipated level of incidental take. To that end, the HCP utilizes two general strategies to provide habitat for snag-dwelling wildlife. The Services anticipate that the combination of the two strategies would result in more habitat for snag-dwelling wildlife than currently exists on the Covered Lands. These two strategies should also result in more habitat than would be lost due to commercial timber harvest and other activities to be covered by the ITP.

The first snag habitat strategy calls for the management of late-seral forest conditions on uplands in the Natural and Conservation Zones (approximately 52% of the Covered Lands). This strategy is based on the assumption that the best way to provide habitat for large snag-dwelling wildlife is to allow large trees and large snags to develop within stands of late-seral coniferous forest (as opposed to conditions found in recent clearcuts). Consequently, management of the Natural and Conservation Zones would emphasize minimal intrusion. No harvesting would occur in the Natural Zone, and only hardwood conversion and commercial thinning would occur in the Conservation Zone to accelerate the development of late-seral forest conditions.

Once a stand in the Conservation Zone reaches 100 years, no further harvest activity would occur. Large trees would be allowed to grow and succumb to natural mortality in these zones. This level of commitment to the development and maintenance of late-seral forest conditions exceeds the commitments of most forestland HCPs in Washington State.

The second strategy is to create snags in the Commercial Zone and in young stands in the Conservation Zone in conjunction with timber harvest activities. All safe snags and up to 10 green recruitment trees would be left in these areas at the time of harvesting. This is a green tree retention rate that exceeds any forestland HCP completed to date. If less than two large safe snags can be retained per acre of harvest, green recruitment trees would be killed to replace them. All of the green recruitment trees would be greater than 12 inches dbh, with at least one

greater than 20 inches dbh and another greater than 16 inches dbh (HCM 3-01G). Under this measure, trees considerably larger than 12 inches dbh could be killed to create snags, but this would depend entirely on the availability of suitable trees at any given site. While these are not particularly large trees from the perspective of some of the large snag-dwelling wildlife in the watershed, they represent the largest trees likely to be available in the second-growth stands that will be harvested on the Covered Lands. Large trees are currently scarce in areas subject to commercial harvest; however, they are expected to become more common as a result of implementing the HCP.

STA 1-87

As noted in HCM 3-01G, all safe snags would be retained at the time of even-aged harvesting, uneven-aged harvesting, commercial thinning and salvage harvesting on the Covered Lands. If less than two large (greater than 12 inches dbh) snags are available and can be safely left, green recruitment trees will be killed to replace them. These green recruitment trees would represent the largest trees available in most stands.

With respect to the "appropriate number" of snags to be retained, see Specific Comment Response STA 1-86. As further described in EMM-01, the persistence and use of created snags will be evaluated at 10-year intervals over the term of the HCP. If data collected on the Covered Lands, or research conducted elsewhere in the region, suggest the need for modification to the snag creation program, Tacoma Water and the Services would make the necessary changes. The Services consider this to be a prudent approach given: 1) the large commitment already being made to the maintenance of late-seral coniferous forest habitat on the Covered Lands; 2) the relative uncertainty about the snag needs of the Covered Species (as evidenced by wide-ranging recommendations in the scientific literature); and 3) the long term reduction in the number of large green recruitment trees (i.e., potential large snags) that would result from killing those same trees while they are still small.

STA 1-88

Adaptive management for snag-dwelling wildlife is described in EMM-01 (HCP subsection 6.2.10). The habitat needs of all Covered Species would be addressed through this process, and modifications to the snag retention and creation program can be made to accommodate the needs of any one or all of those species.

STA 1-89

Tacoma Water and the Services welcome the participation of the WDFW in the monitoring, evaluation, and adaptive management of the snag retention and creation program on the Covered Lands.

STA 1-90

See General Comment Response 25.

The Services realize that management on a species-by-species basis is not always a desirable approach. With over 270 vertebrate species native to the west slope of the Cascade Mountains (Brown 1985), writing and implementing individual management programs and objectives for even a fraction of these could result in conflicting and contradictory management objectives. A more practicable approach would be to manage for habitat at the community level, and implement species-specific measures only for key habitat elements or locations (e.g., nests and dens), and at key times of the year (e.g., the nesting or denning seasons). The Tacoma Water HCP incorporates that approach.

Approximately 52 percent of the Covered Lands would be managed to develop and maintain late-seral coniferous forest of the type that dominated the watershed prior to European settlement. Additionally, the 26 percent of the Covered Lands that would be managed for even-aged timber harvest would emphasize long rotations (70 years), riparian buffers, and the retention of key legacy habitat features (large trees, snags, and logs). We anticipate that this combination of management would provide habitat for most, if not all, native wildlife species on the Covered Lands.

The remaining issue is one of minimizing the impacts of human activity in and near these habitats. To that end, HCP subsection 5.3.4 contains several species-specific measures to avoid or minimize human activity around key habitats to protect those habitats from disturbance or alteration.

Planning for and monitoring wildlife on a species-by-species basis could be done on the Covered Lands, but the cost to implement such a program could exceed the revenues anticipated under the HCP, with potentially little additional benefit to Covered Species.

STA 1-91

As noted in Specific Comment Response STA 1-90, the primary focus of wildlife habitat management in the HCP would be at the community level. Therefore, monitoring under CMM-12 would document maintenance and enhancement of habitat at the community level. Species-specific monitoring would occur under CMM-15. Tacoma Water would maintain records on the annual status of spotted owl, bald eagle, peregrine falcon, and northern goshawk nest sites subject to protection under one or more measures of the HCP. This information would be provided to the USFWS and WDFW. The persistence of these sites would be monitored through these data.

STA 1-92

Comment noted.

STA 1-93

All green recruitment trees left to satisfy HCM 3-01G would be required to meet all requirements of that measure, regardless of whether they also satisfy the requirements of another measure such as HCM 3-01C. In response to WDFW comments on a prior draft of the HCP, the HCP was revised to require that green recruitment trees be selected with preference given to large, live defective trees.

STA 1-94

Tacoma Water and the Services currently have no specific examples of instances where an increased rate of harvest may be desirable in the Conservation Zone. Given the period of time covered by the HCP, however, Tacoma Water and the Services consider it prudent to allow such flexibility in the management of the Covered Lands. As noted in HCM 3-01C, any increase in the rate of harvest would occur only to benefit fish, wildlife, and/or water quality, and only with prior review of the WDFW and approval of the Services.

STA 1-95

Comment noted.

STA 1-96

As stated in the draft and final HCP, HCM 3-01E indicates there would be no hardwood conversion in no-harvest riparian buffers. Black cottonwood and bigleaf maples in these riparian areas would be protected from harvest. All black cottonwood and bigleaf maples in the Natural Zone and in stands over 100 years in the Conservation Zone would also be protected from harvest.

STA 1-97

As stated in the draft and final HCP, HCM 3-01G requires the retention of large defective live trees in the Commercial Zone.

STA 1-98

See Specific Comment Response STA 1-96. This information was provided in the draft and final HCP.

STA 1-99

The last two text bullets in HCM 3-01F specify when salvage conditions exist. Salvage harvesting may occur "when insects, fire, windthrow, or disease (or flood in the Commercial Zone) reduces total canopy closure to less than 40 percent over 2 or more acres."

STA 1-100

Salvage harvesting in the Commercial Zone can include the removal of all types of standing and dead material (live trees, snags, and logs), except trees, snags, and logs that must be retained to satisfy HCM 3-01G. Also note that during review of this comment and HCM 3-01G, Tacoma Water and the Services identified a needed revision. The requirement in HCM 3-01G to retain all safe snags in salvage units has been deleted. This requirement would effectively preclude salvage harvesting, but it is not the intent of the HCP to do so. HCM 3-01F has also been revised to specify that at least six safe snags would be retained during salvage harvesting.

Salvage harvesting in the Conservation Zone can also include the removal of all types of standing and dead material (live trees, snags, and logs). Salvage harvesting in this zone must comply with HCM 3-01G, as well as with the uneven-aged harvesting requirements of HCM 3-01C (i.e., retention of at least 50 healthy dominant or codominant conifers per acre, where available).

STA 1-101

For the purposes of HCM 3-01F, a "significant area" is a reduction of total canopy closure to less than 40 percent over 2 or more acres.

STA 1-102

The green tree retention requirements associated with uneven-aged harvesting (HCM 3-01C), and the snag, green tree, and log retention requirements for all types of harvesting (HCM 3-01G), are designed to provide log habitat. The high snag, green tree, and log retention standards are expected to lead to log levels considerably higher than those that currently exist on the Covered Lands, and higher than would occur under traditional commercial forestry without the HCP.

STA 1-103

The suggested language is already contained within HCM 3-01G. It was added in response to WDFW comments on an earlier draft of the HCP.

STA 1-104

Comment noted. See Specific Comment Response STA 1-86. Created snags must be at least 12 inches dbh, but there is nothing to preclude the killing of larger green recruitment trees if they are available. We anticipate that snags larger than 12 inches dbh would develop over the life of the HCP in the Natural Zone, Conservation Zone, no-harvest riparian buffers, Upland Management Areas, and patches of green recruitment trees within upland harvest units.

STA 1-105

See Specific Comment Response STA 1-87. Tacoma Water and the Services have chosen to create fewer than five snags per acre during the first decade of the HCP.

Most of the stands potentially affected by the snag creation measures in the first decade of the HCP are young second-growth conifer stands in the Conservation and Commercial Zones. Therefore, we believe aggressive snag creation in these stands during the first decade under the HCP would likely produce an abundance of small snags, but few large snags. Monitoring and adaptive management would allow for more aggressive snag creation in future decades if necessary.

STA 1-106

Currently, Tacoma Water and the Services do not anticipate artificial snag creation in the Natural Zone, or in stands over 100 years old in the Conservation Zone. The rationale behind this is discussed in Specific Comment Response STA 1-86. The monitoring and evaluation measure EMM-01 in the draft and final HCP requires that snag persistence and use would be monitored in the Conservation and Commercial Zones at 10-year intervals. If data collected during this monitoring suggest the need to increase the number of snags in these zones in the future, Tacoma Water and the Services would consider artificial snag creation.

STA 1-107

Trees in riparian buffers would only satisfy green recruitment tree requirements for harvest units in the Commercial Zone (26% of the Covered Lands) directly adjacent to streams and wetlands (HCM 3-01G). Since the maximum even-aged harvest unit size is 40 acres (HCM 3-01H), it is anticipated that there would be units in the Commercial Zone not adjacent to streams or wetlands. Green recruitment tree requirements in these non-riparian units would be met with upland trees, individually or in patches. Because the maximum distance between clumps of green recruitment trees is 600 feet (HCM 3-01G), even the harvest units directly adjacent to streams or wetlands would likely need additional patches of green recruitment trees in upland locations. Additionally, all safe snags would be retained at the time of harvesting regardless of their locations.

Upland late-seral forest conditions would also be provided on several thousand acres throughout the Natural and Conservation Zones (collectively about 52% of the Covered Lands) for any species that may require forest habitat outside riparian buffers. The Natural Zone includes a large contiguous block (approximately 1,500 acres) of upland coniferous forest in the Friday and Rock Creek drainages along the mainstem of the Green River. In addition, much of the habitat in the Conservation Zone is upland, and most of this should become late-seral coniferous forest over the life of the HCP.

STA 1-108

The Services do not consider the HCP to be less protective than current Washington Forest Practices Rules with respect to snags, green recruitment trees, and logs. The spatial distribution of snags and green recruitment trees would be better than under current Forest Practices Rules for the following reasons:

- Approximately 52 percent of the Covered Lands would be managed to maintain late-seral forest conditions that include large trees, snags, and logs.

- All safe snags would be left in areas where timber harvesting occurs, regardless of their location on the landscape.

- The maximum allowable even-aged harvest unit size is 40 acres (not 120 acres as stated by the commenter), and green recruitment tree requirements must be met within each individual unit.

- The maximum distance between green recruitment tree patches is 600 feet, so there would likely be multiple patches even within small harvest units.

STA 1-109

See Specific Comment Response STA 1-107.

STA 1-110

See Specific Comment Response STA 1-108.

The suggested change was made in the draft and final HCP in response to WDFW comments on an earlier draft of the HCP.

STA 1-111

In response to WDFW comments on an earlier draft, site-specific measures were developed to protect Northwestern pond turtles in the final draft HCP (HCM 3-04X).

STA 1-112

As indicated in the draft and final HCP, HCM 3-02A provides protection for wetlands smaller than 0.5 acre. Type A wetlands as small as 0.25 acre would have 100-foot no-harvest buffers, and Type B wetlands as small as 0.25 acre would have 50-foot no-harvest buffers. In addition, all wetlands (including those less than 0.25 acre) in the Natural Zone and most wetlands in the Conservation Zone would receive full protection because of the general restrictions on harvest activity and road construction in those zones (HCMs 3-01B and 3-01C). Lastly, small wetlands

associated with surface drainages in the Commercial Zone (which are expected to be the majority of the wetlands in the zone) would be protected by no-harvest buffers required under HCM 3-02A.

Very few small, isolated wetlands are expected outside of the riparian buffers because of the moderate to steep terrain of the Commercial Zone. Therefore, the number of unprotected small wetlands on the Covered Lands is expected to be minimal.

STA 1-113

As indicated in the draft and final HCP, the Tacoma Water HCP contains six measures (HCMs 3-04A, 3-04B, 3-04C, 3-04D, 3-04E, and 3-04F) specifically developed to minimize physical alteration of occupied grizzly bear habitat and to avoid human disturbance of grizzly bears. These are in addition to the general HCP requirements to maintain late-seral forest conditions over approximately 52 percent of the Covered Lands, regardless of grizzly bear presence.

If grizzly bears appear in the upper watershed in the future, the provisions of the HCP would provide ample opportunity to prepare adequate plans for habitat protection. As the federal agency with responsibility for ESA protection and recovery of the grizzly bear, the USFWS is confident it can work with Tacoma Water and WDFW to develop effective and practicable protection measures if and when the need arises.

STA 1-114

See Specific Comment Response STA 1-113. Like the grizzly bear, the gray wolf is extremely rare in the central Washington Cascades. The USFWS believes the measures already contained in the Tacoma Water HCP would provide ample opportunity for site-specific planning in the event that wolves inhabit the area in the future. Larger disturbance buffers might provide increased assurance that future Tacoma Water activities would not disturb denning or rendezvous sites, but they would also create the potential for encumbering even more City-owned lands in the watershed. Tacoma Water has already dedicated approximately 52 percent of the Covered Lands (7,812 acres of uplands) to permanent protection as fish and wildlife habitat.

STA 1-115

Tacoma Water would provide long-term habitat protection for the fisher by dedicating approximately 52 percent of the Covered Lands (7,812 acres) as permanent late-seral coniferous forest reserve in large, contiguous, low-elevation blocks along the Green River and its major tributaries. Additionally, streams and lakes on the remaining 26 percent of the Covered Lands that are not reservoir would have no-harvest riparian buffers up to 200 feet wide where late-seral coniferous forest would develop. Potential habitat for the fisher is expected to increase substantially under this management strategy. HCM 3-04H is simply intended to minimize human disturbance in and around the new habitat if it becomes occupied by fishers.

STA 1-116

See Specific Comment Responses STA 1-86 and STA 1-115. The HCP already includes strategies for promoting the natural development of large snags and logs in the Natural and Conservation Zones and actively growing large trees and creating large snags in the Commercial Zone. All of these features could be used as den habitat for Pacific fishers. These strategies include monitoring and adaptive management, as described in EMM-01.

STA 1-117

See Specific Comment Responses STA 1-86, 1-87,1-115, and 1-116.

STA 1-118

Dens of the California wolverine and Canada lynx are expected to be rare on the Covered Lands. Den site protection measures (HCMs 3-04I and 3-04J) are included in the HCP to provide seasonal protection in the event that one or both of these species establishes a den on or near Covered Lands, including the Commercial Zone. Den site protection could also be necessary if Tacoma Water acquired high-elevation lands in the upper watershed where one or both of these species might be more common. Long-term protection would be provided by restricting harvest in the Natural and Conservation Zones. See also Specific Comment Responses STA 1-113 and STA 1-114.

STA 1-119

The breeding season timing restriction in HCM 3-04M applies from 1 January through 31 August. This change was made in response to WDFW comments on a prior HCP draft.

STA 1-120

Habitat Conservation Measure 3-04N has been revised as suggested. The long-term buffer distance on bald eagle nests and communal winter roosts has been increased from 330 feet to 400 feet.

STA 1-121

The HCP is based on landscape-level management for bald eagles and other species (General Comment Response 25). If approved, the HCP would be in full compliance with the ESA with respect to bald eagles. Over the long term, it is expected that the maintenance of large tracts of low-elevation, late-seral coniferous forest along the Green River and its major tributaries (the Natural and Conservation Zones) and the reestablishment of anadromy above Howard Hanson Dam would increase summer and winter use of the upper watershed by bald eagles. New nests and communal winter roosts are most likely to occur in the Natural and Conservation Zones, where suitable habitat would be provided.

Habitat Conservation Measures 3-04M and 3-04N are simply provided to minimize human disturbance of bald eagles nesting or roosting in these habitat reserves. Nest and roosts could also occur outside the Natural and Conservation Zones, particularly in the large no-harvest riparian buffers. Habitat Conservation Measures 3-04M and 3-04N would be applied to nests and roosts in riparian forest buffers as well, if needed. Long-term protection of additional lands outside the buffers and the Natural and Conservation Zones would not be provided. The potential impacts to nests and roosts outside areas protected under the HCP is incidental take that would be allowed under the approved ITP.

STA 1-122

The effects of the Tacoma Water HCP on anadromous fish are discussed in HCP subsections 7.1 through 7.2, and DEIS subsection 4.2.6. Anadromous fish stocks in the Green River are not expected to decline under the HCP. Restoration of anadromous fish to the upper Green River basin and improvements in spawning and rearing habitat throughout the watershed are expected to increase the number and distribution of anadromous salmonids, thus improving foraging opportunities for bald eagles.

STA 1-123

Comment noted.

STA 1-124

See Specific Comment Response STA 1-86. The strategy for management of the Conservation Zone is to protect late-seral coniferous forest where it currently exists, and to accelerate the development of late-seral forest where it does not exist. Stands over 100 years old would not be entered for harvest or salvage logging. Conifer stands less than 100 years old would be commercially thinned to increase the diameter growth of remaining trees. Stands less than 100 years old dominated by hardwoods would be harvested and converted to conifers, again to shorten the time required to reach late-seral forest conditions.

Snag and green recruitment tree quotas identified in HCM 3-01G would be met during all commercial thinning and hardwood conversion. The target forest condition in the Conservation Zone is a stand dominated by large coniferous trees, with large snags, large logs, multiple size classes of understory trees, and well-developed shrub and forb layers. The amount of time required to reach this condition would vary from site to site, depending on current conditions and site fertility.

Tacoma Water has prepared neither a detailed target for spotted owl habitat, nor a detailed schedule for creating such habitat. Given the conservative nature of the HCP with respect to spotted owls, such a level of precision is unwarranted. Timber harvest activities covered by the ITP would have the potential to reduce the total amount of suitable spotted owl habitat below 40 percent within 1.8 miles of only one spotted owl activity center, and that activity center has non-resident status (see HCP Table 7-33). All other 1.8-mile circles on the Covered Lands that have more than 40 percent suitable habitat would be maintained at or above 40 percent. In those with less than 40 percent, Tacoma Water would conduct no harvest of existing suitable habitat.

In exchange for the potential impact upon a single non-resident spotted owl activity center, Tacoma Water would protect 1,325 acres of existing suitable habitat (mostly in the Natural and Conservation Zones) and would allow for the development of approximately 6,500 additional acres (also in the Natural and Conservation Zones). With long harvest rotations (70 years) and aggressive green recruitment tree retention in the Commercial Zone, additional suitable spotted habitat is likely to develop there as well under the HCP.

As described in HCMs 3-04O and 3-04P, known activity centers would be monitored according to USFWS protocol only when habitat alteration is proposed within 660 feet of an activity center, or when other potentially disturbing activities are planned for the general area (up to 1 mile in the case of blasting) during the nesting season. Protocol surveys are disruptive to nesting spotted owls, and would not be conducted under the HCP unless warranted by management activities.

STA 1-125

It is common practice in forestland HCPs to relax seasonal nest-site protection measures in years when resident spotted owls do not nest. Seasonal protection measures are intended to minimize human activity around active spotted owl nests, because such activity can interfere with normal nesting behavior and threaten the survival of nestlings. In years when the adults are not nesting, they are considerably more mobile and less vulnerable to activity that displaces them temporarily from a small portion of their home range. Relaxation of seasonal nest site protection during non-nesting years should not be a threat to the long-term survival of spotted owls, provided that sufficient habitat remains available within established home ranges.

STA 1-126

The Tacoma Water HCP goes considerably beyond seasonal timing restrictions to perpetuate spotted owls in the upper watershed. The majority of the suitable spotted owl habitat on the Covered Lands lies within the Natural and Conservation Zones. All of the habitat in these two zones would be protected under the HCP, and several thousand acres of new habitat would be provided contiguous with it over time as a result of management under the HCP. There would be no benefit to mapping and surveying the habitat in these zones at this time, as it would all be protected regardless of the results of surveys.

The WDFW comment correctly paraphrases the HCP in saying that 31 acres of suitable spotted owl habitat would not be sufficient to maintain long-term nesting, but it fails to acknowledge the remainder of the paraphrased sentence, which points out that the intent of the 31-acre protection is simply to minimize the impacts of timber harvesting in the Commercial Zone (roughly 26% of the Covered Lands). The broader strategy for spotted owl management on the Covered Lands is to protect and enhance habitat in the Natural and Conservation Zones (see Specific Comment Response STA 1-124).

The resource objectives for spotted owl habitat are those in HCMs 3-01A, 3-01B, and 3-01C, which commit Tacoma Water to managing the Natural and Conservation Zones for large blocks of contiguous, late-seral coniferous forest. Also related are HCM 3-01G and other measures that require the maintenance of snags, logs, and other key wildlife habitat features in all three management zones. No additional biological certainty is necessary.

STA 1-127

The primary management strategy in the HCP for the northern goshawk and other species associated with mature coniferous forest is to create and maintain late-seral forest habitat on the 7,812 acres of uplands in the Natural and Conservation Zones. Site-specific management plans are not necessary for these two zones, because management activity would be limited to alder conversion (in non-habitat), commercial thinning (to create habitat or improve marginal habitat), and snag creation (if adaptive management suggests the need). Secondary to the maintenance of habitat in the Natural and Conservation Zones is the protection of goshawk nests that are discovered in the Commercial Zone. Given the long harvest rotations under the HCP (at least 70 years) and the high snag and recruitment tree retention rates, goshawk nesting in the Commercial Zone is a real possibility. Seasonal and long-term protection of nests would minimize impacts associated with harvest activities in the Commercial Zone, but it is not the intent of the HCP to maintain stable nest sites in the Commercial Zone. To do so would likely require the long-term commitment of additional lands, and leave Tacoma Water with little incentive to pursue an HCP for the upper watershed.

Habitat Conservation Measure 3-04R specifies a buffer of 660 feet rather than a comparable acreage of the "best available habitat" because the latter is too vague and open to interpretation to provide reasonable certainty to Tacoma Water or the USFWS. A specified linear distance can be implemented on the ground with accuracy and consistency, and easily monitored for compliance. Protection of the best available habitat, on the other hand, would require either detailed involvement by the USFWS and WDFW for each nest, or the development of detailed guidelines in the HCP for identifying the "best" habitat. Neither approach has proven satisfactory in other HCPs.

STA 1-128

Comment noted.

STA 1-129

See Specific Comment Response STA 1-127. The seasonal buffers and timing restrictions in HCM 3-04Q are appropriate, given they constitute the secondary strategy for goshawk protection on the Covered Lands. The primary strategy of maintaining large contiguous blocks of habitat in the Natural and Conservation Zones would protect nesting and post-fledging habitat at levels commensurate with the anticipated level of incidental take. As an added margin of safety, the seasonal and long-term protection of goshawk nests on the Covered Lands would be monitored in accordance with the adaptive management provisions of EMM-02. If such monitoring indicates the need to adjust seasonal buffers in the future, such adjustments would be made.

STA 1-130

See Specific Comment Response STA 1-129. Extending the seasonal restriction to 31 September would only be necessary to protect post-fledging habitat beyond that already provided in the Natural and Conservation Zones. That is not the intent of the Tacoma Water HCP.

STA 1-131

The Services and Tacoma Water anticipate the Tacoma Water HCP would result in the development and long-term protection of several thousand acres of habitat meeting this definition on the Covered Lands, primarily in the Natural and Conservation Zones.

STA 1-132

The contiguous nature of the forest habitat in the Natural and Conservation Zones should provide several nesting opportunities for species like the goshawk that appear to require habitat in large patches.

STA 1-133

The Tacoma Water HCP already accounts for goshawks that may not nest every year, as well as goshawks that use alternate nests from year to year. All nests, regardless of use, would be protected in the Natural and Conservation Zones. In the Commercial Zone, a known nest would only be subject to possible removal if it has gone unused for 8 consecutive years**.**

STA 1-134

Commercial thinning would be conducted in the Conservation Zone to hasten the development of late-seral coniferous forest conditions. Snags and green recruitment trees would be retained at the time of commercial thinning in accordance with HCM 3-01G, and additional snags would be created if warranted by EMM-02. It is anticipated this approach would result in habitat meeting the definition in Specific Comment Response STA 1-131 over time, to the benefit of the northern goshawk and several other native species that use mature and late-seral coniferous forest.

It is not the intent of the Tacoma Water HCP to maintain a target population of goshawks on the Covered Lands, or to evaluate the success of the mitigation measures by measuring the population. The Tacoma Water HCP is a habitat-based HCP, and the success of the HCP would be judged by the amount of habitat that would be provided. Roughly 52 percent of the Covered Lands would be dedicated to late-seral forest habitat reserves in which habitat for the northern goshawk and other forest-dwelling species would be protected and enhanced. It might theoretically be possible to accelerate the development of goshawk habitat on the Covered Lands even more than would occur under the HCP, but this would likely result in greater short-term disturbance to goshawks and other wildlife species, and require additional effort on the part of Tacoma Water that would jeopardize the economic viability of the HCP for the upper watershed.

STA 1-135

HCM 3-04S is by no means the sum total of mitigation for the pileated woodpecker under the Tacoma Water HCP. Roughly 52 percent of the Covered Lands would be dedicated to the development and maintenance of large, contiguous blocks of late-seral coniferous forest under HCMs 3-01B and 3-01C. Large snags and green recruitment trees would be maintained on these lands in accordance with HCM 3-01G, and additional snags may be created in accordance with EMM-02. The 26 percent of the Covered Lands available for even-aged commercial timber harvest will be managed on a 70-year harvest rotation, and streams would have no-harvest buffers up to 200 feet wide. Large snags and green recruitment trees would be provided at densities of at least 10 per acre in areas subject to even-aged harvest, and additional snags may be created if required under EMM-02. Habitat Conservation Measure 3-04S is simply a minor addition to all of these measures to ensure that snags and live trees with signs of pileated woodpecker use are favored for retention at the time of commercial timber harvest.

STA 1-136

The USFWS and Tacoma Water agree that pileated woodpeckers probably play an important role in creating habitat for secondary cavity users. Habitat for pileated woodpeckers (e.g., large snags and green recruitment trees within closed-canopy forest) would be provided on the Covered Lands partially in recognition of the importance of the species.

STA 1-137

The Tacoma Water HCP is not designed to maintain target wildlife populations. Management for target numbers of pileated woodpeckers would be inconsistent with the habitat-based approach of the HCP.

STA 1-138

The Services and Tacoma Water agree that large hollow snags are important wildlife habitat features, particularly because they are rare on managed landscapes like the Covered Lands. For that reason, all snags in the Natural Zone, in stands over 100 years old in the Conservation Zone, and in no-harvest riparian buffers in the Commercial Zone (except those posing a safety hazard along roads) will be retained for the term of the HCP. Similarly, all safe snags in the Commercial Zone and in stands less than 100 years old in the Conservation Zone would be retained during harvest activities. Snags in the Natural Zone, Conservation Zone, and riparian areas would automatically be buffered by the fact that no even-aged harvesting would occur there (except in hardwood conversion units in the Conservation Zone). On less than 20 percent of the Covered Lands (the non-riparian portions of the Commercial Zone) there is the potential for large snags to be retained individually without buffers. However, clumping of snags and green recruitment trees in the Commercial Zone is encouraged by HCM 3-01G, so many of the snags in harvest units would be buffered as well.

STA 1-139

See Specific Comment Response STA 1-139. Less than 20 percent of the Covered Lands has the potential for unbuffered snags under the Tacoma Water HCP, and the number of large snags on these lands is expected be small. Habitat Conservation Measure 3-01G already encourages clumping of green recruitment trees around snags. Additional buffering would provide limited benefit to the Covered Species, but could result in substantial operational difficulties for Tacoma Water during timber harvest activities.

STA 1-140

The use of pesticides is not proposed as a covered activity under the Tacoma Water ITP. Consequently, restrictions on the use of pesticides are not appropriate in the HCP.

STA 1-141

Habitat Conservation Measure 3-04W contains the management strategy for protecting marbled murrelets. It covers all "occupied" sites, "presence" sites where occupancy status has not been resolved, and suitable nesting habitat that has not been fully surveyed to protocol. It applies to habitat on the Covered Lands and on adjacent lands. It requires seasonal disturbance buffers that meet or exceed Washington Forest Practices Rules pertaining to the protection of marbled murrelets (WAC 222-30). Seasonal disturbance buffers need not be expanded.

STA 1-142

Protocol surveys for marbled murrelets are not necessary under the Tacoma Water HCP because no suitable marbled murrelet nesting habitat is proposed for harvest or alteration. Suitable nesting habitat in reserves (e.g., the Natural Zone) and on adjacent lands would also be protected from disturbance by the seasonal disturbance buffers in HCM 3-04W. In response to WDFW comments, this measure has been modified to include seasonal disturbance buffers on suitable but unsurveyed marbled murrelet nesting habitat.

STA 1-143

The seasonal disturbance buffers in HCM 3-04W already apply to "occupied" and suitable but unsurveyed marbled murrelet habitat on lands adjacent to the Covered Lands. No further changes to the measure are necessary.

STA 1-144

The creation of edge conditions along occupied marbled murrelet nesting habitat could lead to incidental take of marbled murrelets, and it is this potential incidental take for which Tacoma Water is seeking coverage. Any requirement to provide buffers along such edges would eliminate the need for the ITP, but provide relatively little corresponding benefit to the species.

There are a large number of late-seral forest reserves on and adjacent to the Covered Lands, and a substantial proportion of lands in the Commercial Zone could be directly adjacent to suitable

marbled murrelet nesting habitat in the future. Buffering all this edge, or requiring protocol surveys prior to even-aged harvest adjacent to the edge, could place substantial restrictions on the ability of Tacoma Water to harvest timber in the Commercial Zone. Conversely, the overall impacts of harvesting to the edge of the Covered Lands are small because of the long harvest rotations (≥70 years), the small even-aged harvest unit size (≤ 40 acres), and the relatively small overall size of the Commercial Zone (roughly 26% of the Covered Lands).

STA 1-145

Tacoma Water and the USFWS will continue to classify "occupied" habitat according to the protocol established by the Pacific Seabird Group (PSG). Currently, the PSG does not treat "presence" habitat as "occupied" if full-protocol surveys fail to establish occupancy.

STA 1-146

Additional restrictions on water withdrawal and storage to enhance habitat for the Oregon spotted frog are neither necessary nor appropriate. As can be seen by comparing DEIS Figures 4-1 and 4-4, the Tacoma Water HCP would result in virtually no change in the hydrograph of the middle and lower reaches of the river from 1 February through 1 April in wet and average years, and very little change in dry years. Fluctuations in flow would occur during these times with or without the Tacoma Water HCP. Moderation of flows could only be achieved by altering the regime for storage and release of water at Howard Hanson Dam, but this would have substantial consequences to other management priorities in the river (e.g., flood control and fisheries). While fluctuations in flow may be detrimental to breeding Oregon spotted frogs, such fluctuations are unavoidable due to the natural flow regime of the river and the need to manage for flood control and fisheries. The historic existence of such flow fluctuations may explain the general absence of the Oregon spotted frog from the mainstem of the Green River, as it is a species primarily associated with calm waters and sluggish streams (Leonard et al. 1993). Tacoma Water has requested an ITP for the Oregon spotted frog only to cover the unlikely event that habitat enhancement efforts (e.g., wetland creation) and flow alterations to benefit fisheries in the Green River impact spotted frogs. Additional mitigation for spotted frogs is not necessary.

STA 1-147

Habitat Conservation Measure 3-04U has been revised to indicate that all areas found to be occupied by Larch Mountain salamanders, regardless of size, would receive 50-foot buffers in which there would be no timber harvesting, yarding, or road construction.

STA 1-148

HCM 3-04U has been revised to require surveys for Larch Mountain salamanders in all potential habitats, and protection of all habitats found to be occupied, regardless of forest cover type.

STA 1-149

See Specific Comment Response STA 1-148.

STA 1-150

Comment noted.

STA 1-151

This comment would appear to make HCM 3-04X largely unnecessary. The majority of the Covered Lands lie above Howard Hanson Dam, and therefore above 1,000 feet in elevation. Only a small portion of the Covered Lands is below Howard Hanson Dam, and most of it is either project facility lands (e.g., headworks and intake structures) or it is designated as Natural Zone along the mainstem of the Green River. The potential for impacting Northwestern pond turtles on facility lands and in the Natural Zone is negligible. A small percentage of the Covered Lands below Howard Hanson Dam is designated as Conservation Zone, however, and commercial thinning activities could occur on these lands. Habitat Conservation Measure 3-04X would therefore be retained to cover the potential for conducting harvest activities near wetlands below 1,000 feet in elevation in the Conservation Zone.

STA 1-152

The Tacoma Water HCP is a habitat-based HCP, with primary emphasis on the protection and enhancement of late-seral coniferous forest, riparian forest, wetlands, and other unique habitats. Consequently, the monitoring of HCP implementation would focus on habitats rather than wildlife populations. As described in CMM-12, monitoring would include documenting the current condition (i.e., stand age) of forest habitats, the locations of sensitive and unique habitats

(e.g., meadows and talus fields), and any management activities that have occurred in these habitats. The locations and conditions of riparian buffers would be reported in accordance with CMM-13, and the effectiveness of snag retention measures would be monitored in accordance with EMM-01. Compliance monitoring for the retention of trees and snags used by pileated woodpeckers and Vaux's swifts, as noted in CMM-15, would occur as part of the overall reporting on compliance with snag and green recruitment tree retention, as described on lines 24 through 27 of CMM-12.

STA 1-153

Comment noted.

STA 1-154

The specific protocols for collecting and analyzing snag data on the Covered Lands would be developed prior to the first round of sampling that would occur during Year 10 of HCP implementation. Given the ongoing debate in the scientific community over the appropriate methods of sampling for irregularly distributed habitat features such as snags, Tacoma Water and the USFWS do not consider it prudent to specify detailed sampling methods at this time.

STA 1-155

The commenter is correct, see revised HCP Chapter 6, Page 6-53, line 10 in the FEIS, Volume II, Section 5.0, Revised HCP Chapters 5, 6, and 8.

STA 1-156

With respect to wildlife species, Tacoma's approach was to set aside the majority of its forested lands, thereby reducing the need to develop an intensive monitoring and adaptive management program for those Covered Species. Of the 11,644 acres of forested lands available for harvest on Tacoma's ownership, approximately 3,200 acres is proposed for commercial timber harvest under the HCP. The remaining lands would either be in the Natural Zone, Conservation Zone, riparian buffers, or Upland Management Areas. Over the term of the HCP, it is anticipated that these areas would provide the desired habitats by allowing them to develop with little or no intervention on the part of Tacoma. Evaluation and Monitoring Measures EMM-01 and EMM-02 do allow for adjustments in the creation of snags and species-specific measures.

STA 1-157

The Tacoma Water HCP provides no-harvest streamside buffers larger than any existing HCP or strategy for amphibian management of non-federal lands in the Pacific Northwest. The HCP also exceeds the recommendations of the recently developed Forests and Fish Report, and the corresponding changes to Washington Forest Practices Rules for both fish-bearing and non-fish-bearing streams. In exchange for this level of streamside protection, Tacoma Water is requesting an ITP to cover the remote possibility of impacting these three species of stream salamanders. Integral to Tacoma Water's incidental take coverage will be the certainty that no additional mitigation will be required outside of Unforeseen Circumstances (HCP subsection 3.2.2) or Changed Circumstances (HCP subsection 3.2.3). This level of regulatory certainty is appropriate under ESA Section 10 and the No Surprises Policy. A reduction in certainty for Tacoma Water, as suggested by WDFW, would eliminate the benefits of the ITP and reduce the need for the portion of the HCP covering the upper watershed.

STA 1-158

Tacoma Water has not surveyed the Covered Lands specifically for the presence of Cascade torrent salamander habitat. Headwall streams, if they exist on the Covered Lands, would be protected under HCMs 3-01N, 3-02A, 3-02B, 3-03A.

STA 1-159

The operation of Howard Hanson Dam and inundation of the reservoir are federal activities carried out by the USACE. They are not covered activities under Tacoma Water's ITP, and therefore are not addressed in the HCP.

STA 1-160

The reservoir is a federal facility operated by the USACE, therefore, Tacoma Water is not in the position to manage for loons on Howard Hanson Reservoir as part of the Tacoma Water HCP.

STA 1-161

Literature noted.

Comment Responses to Washington Department of Ecology (STA-2)

STA 2-1
Comment noted.

STA 2-2
Comment noted.

STA 2-3
Comment noted.

STA 2-4
Comment noted.

STA 2-5
Approval of this plan will not shift the burden of recovery onto others or foreclose on the development or use of information from the Green-Duwamish Watershed Analysis. On the contrary, Tacoma Water, in HCM-3-03A, has committed to continue to participate in Watershed Analysis and to implement all prescriptions prescribed through the Watershed Analysis process, unless such prescriptions would be less restrictive than similar measures committed to in the HCP. In addition, the HCP by ESA regulation (Section 10(a)(2)(B)) cannot preclude the recovery of listed species and, therefore, the approval of this plan should not hamper the development of recovery plans for listed species.

STA 2-6
The USACE operation of Howard Hanson Dam is addressed from an ESA perspective by Section 7 consultation, which is currently taking place. The Services are currently completing review of the biological assessment provided by the USACE and will subsequently issue their Biological Opinion. The ESA response developed by the USACE has been closely coordinated with the HCP proposed by the City of Tacoma. We agree that there are linkages between the USACE operations and the operations of Tacoma Water on the Green River, which must be successfully coordinated to achieve the best result for salmon protection.

STA 2-7

The DEIS analyzes three alternatives for the management of Tacoma Water lands in the Upper Green River Watershed. All three alternatives include measures for the protection of upland, riparian, wetland, and aquatic habitat. The three alternatives differ primarily in the amount of habitat protection they offer. Alternative A (No Action) would provide only the minimum protection required under current state and federal law. Alternative B (the Proposed Action) would provide the added protection proposed in Tacoma Water's HCP. Alternative C (No Commercial Timber Harvest) would provide the maximum amount of habitat protection possible on Tacoma Water lands.

STA 2-8

See General Comment Response 16.

STA 2-9

At this time, a formal description of Properly Functioning Conditions (PFC) has not been established for fish species to be covered by Tacoma Water's application for incidental take coverage. The function of natural riverine processes in the Green River Watershed is discussed in HCP subsection 4.5.3, Current Processes Affecting Fish Habitat and Populations. Conservation measures described in HCP Chapter 5 were designed to contribute to restoration of natural processes in view of existing and expected future conditions of the Green River basin (for example, continued flood control operations by the USACE at Howard Hanson Dam). The conservation measures are expected to contribute to restoring properly functioning conditions in the basin.

STA 2-10

The scientific justification for each conservation measure is provided in HCP Chapter 5 under the Rationale and Ecosystem Benefits subsections.

STA 2-11

The proposed upstream fish passage trap-and-haul program (HCM 1-03), in conjunction with the proposed downstream fish passage facility at Howard Hanson Dam (HCM 2-01), would provide the opportunity to extend the range of anadromous fish species into upper watershed habitats. Except for limited numbers of adult steelhead, adult anadromous fish have been blocked from

accessing these habitats since the completion of Tacoma Water's Headworks in 1913. Details of the upper watershed restoration program are described in the draft Feasibility Report and EIS for the Additional Water Storage Project (U.S. Army Corps of Engineers 1998).

STA 2-12

See General Comment Response 14.

STA 2-13

See General Comment Response 16 for a discussion of Tacoma Water's coordination activities in the lower watershed.

We also anticipate future improved communication and cooperation with landowners in the Upper Green River Watershed. As part of the 1995 Settlement Agreement between the Muckleshoot Indian Tribe and Tacoma Public Utilities, the parties have agreed to initiate an annual meeting of all landowners in the upper watershed of the Green River to exchange information. The annual meetings are intended to encourage cooperation of all upper watershed landowners in implementing watershed actions and participation in projects designed to protect and enhance water quality and fish and wildlife habitat. These annual reviews are expected to lead to a more intensive review of Tacoma Water's upper watershed management program every 5 years as described HCP Chapter 6, Monitoring and Research Program.

STA 2-14

See General Comment Response 2 and Specific Comment Response IND 37-5.

Under Unforeseen Circumstances and No Surprises the role of the state does not change. The definitions used in the HCP are meant to be specific to the HCP process and the issuance of an ITP and, therefore, should not affect the role of the state. Any authorities held or permits granted by the state prior to an unforeseen circumstance would remain following such circumstances.

To learn more about the No Surprises Final Rule we encourage the commenter to refer to the USFWS website that discusses the rule: http://www.endangered.fws.gov/hcp/nosurpr.htm.

STA 2-15

See General Comment Response 14 for a description of the operation agreement between Tacoma Water and the USACE. As noted in HCP subsection 5.2.2, Howard Hanson Dam Non-Dedicated Storage and Flow Management Strategy, the USACE is responsible for coordinating efforts of the Green River Flow Management Committee. It will be up to the USACE, and ultimately NMFS and USFWS, to establish decision-making procedures for the Green River Flow Management Committee.

STA 2-16

The research funding measures in HCP Chapter 6 (for example, RFM-02, A-E, Flow Management) provide the opportunity for testing of explicit assumptions and adaptively managing the resource in view of the results of experimentation. For instance, freshets are a short-term release of high flow designed to initiate movement and increase the survival of downstream migrating salmonid smolts. The release of freshets in the Green River, however, may allow adult steelhead to spawn along the channel margins at high flow levels where the eggs may be dewatered when the flow drops following the freshet. Research conducted under RFM 2-02 will allow the Green River Flow Management Committee to evaluate both beneficial and detrimental effects of freshets and evaluate their use as a management tool to benefit Green River resources.

We agree that monitoring and adaptive management by multiple parties in the Green River Watershed should be coordinated and will ultimately complement salmon recovery efforts in the Green River. Many of the research monitoring measures described in Tacoma Water's HCP subsection 6.3 are designed to address flow management and sediment and woody debris transport issues in the middle and lower Green River Watershed, and could overlap with monitoring and adaptive management associated with the Tri-County Salmon Recovery Effort. See General Comment Response 16 for a discussion of Tacoma Water's coordination activities in the lower watershed.

STA 2-17

Comment noted.

STA 2-18

Comment noted.

STA 2-19

With respect to the clause 2.2(c) of the IA, monitoring and adaptive management are considered to be terms of the HCP.

STA 2-20

If the ITP is approved, the IA will serve as an agreement between Tacoma Water as the permit holder and the Services as the permitting agencies. The purposes of this agreement are: 1) to ensure implementation of each of the terms of the HCP; 2) to describe remedies and recourse should any party fail to perform its obligations as set forth in this agreement; and 3) to provide assurances to the City that as long as the terms of the HCP, the permit, and the agreement are performed, no additional mitigation would be required of the City with respect to Covered Species except as provided for in the agreement or required by law.

Furthermore, the IA does <u>not</u> override or otherwise restrict the authorities and responsibilities of any other local, state, or federal agency that may have the authority to regulate Tacoma Water's activities. Other such authorities were, therefore, not mentioned.

With regard to the part of the comment that suggests the IA should "identify what happens to water supply protection if significant unforeseen circumstances occur to the water flows", The Services' No Surprises Rule regulates how changed circumstances and unforeseen circumstances will be addressed in HCPs. The No Surprises Rule requires that possible changed circumstances be identified and provisions developed and included in the HCP at the time of original plan development. Unforeseen circumstances, on the other hand, cannot be specifically anticipated, nor can specific mitigation measures be identified.

Under the No Surprises Rule, landowners are assured that if "unforeseen circumstances" arise, the Services will not require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed to in the HCP without the consent of the permittee. The government will honor these assurances as long as a permittee is implementing the terms and

conditions of the HCP, Permit, IA, and other associated documents in good faith. In affect, this regulation states that the government will honor its commitment as long as HCP permittees honor their commitments.

The Services believe that it will be rare for unforeseen circumstances to result in a jeopardy situation. However, in such cases, the Services will utilize all of their authorities and resources, will work with other federal agencies to rectify the situation, and will work with the permittee to redirect conservation and mitigation measures that remove the jeopardizing effects. The Services have significant resources and authorities that can be utilized to provide additional protection for threatened or endangered species that are the subject of a given HCP including land acquisition or exchange, habitat restoration or enhancement, translocation, and other management techniques.

STA 2-21

Unforeseen Circumstances are defined in the IA as "changes in circumstances affecting a species or geographic area covered by the HCP that could not reasonably have been anticipated by plan developers and the Services at the time of the HCP's negotiation and development, and that result in a substantial and adverse change in the status of species covered by the HCP." The eruption of Mt. St. Helens is one example of an event that could be categorized as an unforeseen circumstance. The definition in the IA will be the definition the Services and Tacoma Water will use when determining if such an event has occurred.

STA 2-22

Comment noted.

STA 2-23

See General Comment Response 6 for a discussion of coordination efforts between Tacoma Water and other landowners and managers in the Upper Green River Watershed and General Comment Response 16 for a discussion of coordination efforts in the lower Green River Watershed.

STA 2-24

Comment noted.

STA 2-25

Tacoma is currently involved in discussions with Ecology regarding extension of the construction schedule for its Second Diversion Water Right permit S1-00726.

STA 2-26

Refer to DEIS subsection 4.4, Cumulative Effects, which analyzes various land use plans within the Green River Watershed, Physiographic Province, and western Washington region and the combined effects of such plans on each of the proposed Covered Species. Also see General Comment Response 30 for a description of how the Cumulative Effects analysis was augmented in the FEIS.

STA 2-27

Tacoma Water relies on the conjunctive use of surface and groundwater supplies to meet its current demand. Future municipal water demands are also expected to be met through conjunctive use of surface and groundwater. Tacoma Water plans to increase its diversion from the Green River by up to 65 mgd through the exercise of its Second Diversion Water Right. One third of the water diverted under the Second Diversion Water Right will be used by Tacoma Water ratepayers. Two thirds of the Second Diversion Water Right water will be sold to other communities for municipal use.

The list of Tacoma Water's water sources and the amount of water used from each source is presented in the table below (Table STA 2-27) from Tacoma Water's Draft Comprehensive Water Plan Update (December 1998).

Table STA 2-27. Tacoma Water's water sources and the amount of water used from each source.

		Water Right Allocation			Developed Capacity[a]			Current, Sustained Withdrawal Rate
Water Right	**Permit or Certificate**	**gpm**	**mgd**	**af/yr**	**gpm**	**mgd**	**af/yr**	**mgd**
South Tacoma Wells[c,b]								
1B	C216D C783A	3,075	4.4	603 1,028	3,600	5.2	2,115	4.0
2A	C217D C784A	2,025	2.9	393 681	1,200	1.7	275	
2B	C1207A	3,600	5.2	2,122	2,000	2.9	959	2.0
3A	C218D C783A	3,820	5.5	749 1,277	3,500	5.0	1,817	4.1
4A	C219D C784A	1,572	2.3	322 512	1,700	2.4	535	0.8
5A	C220D C783A	5,900	8.5	1,154 1,975	5,100	7.4	4,708	5.6
6A	C221D C784A	3,210	4.6	629 1,073	3,800	5.5	1,281	4.2
7B	C222D C783A	1,126	1.6	221 375	1,050	1.5	218	1.4
8B	C223D C783A	4,337	6.2	853 1,447	4,200	6.1	1,476	4.2
9A	C1566A	5,500	7.9	3,730	3,500	5.0	1,894	4.5
10B	C2665BC	600	0.9	952	1,000	1.4	267	
10C	C2665AC	600	0.9	968	550	0.8	295	0.8
11A	C513A	6,000 3,500	8.6 5.0	3,100 2,000	9,350	13.5	5,317	8.3
12A	C2873A	6,000	8.6	4,242	5,000	7.2	3,605	4.3
13A	G2-27860P	750	1.1	907[f]	750	1.1	74	1.1
14A	G2-27861P	2,700	3.9	3,000[f]	Not Developed			
TOTAL South Tacoma		54,315	78.1	30,406	46,300	66.7	24,836	45.3

NOTE: See Legend at the end of this table.

Table STA 2-27. Continued.

		Water Right Allocation			Developed Capacity[a]			Current, Sustained Withdrawal Rate
Water Right	**Permit or Certificate**	**gpm**	**mgd**	**af/yr**	**gpm**	**mgd**	**af/yr**	**mgd**
University Place[b]								
UP#1	C715B C1053A	300 1,000	0.4 1.4	480[e] 700	1,100	1.6	235	1.6
U3	590D	500	0.7	356	500	0.7		
U4	591D	300	0.4	214	300	0.4		
U8	2904A	750	1.1	1,200	750	1.1		
U9	4261A	1,200	1.7	1,920	1,200	1.7		
UP#10	C5858A	1,500	2.2	2,400[f]	1,500	2.2	110	2.1
U11	G2-00097C	1,000	1.4	800	1,000	1.4		
U12	G2-00033C	1,400	2.0	143 1,457[f]	1,400	2.0		
TOTAL University Place Wells		7,950	11.3	5,388	7,750	11.1	345	3.7

NOTE: See Legend at the end of this table.

Table STA 2-27. Continued.

		Water Right Allocation			Developed Capacity[a]			Current, Sustained Withdrawal Rate
Water Right	**Permit or Certificate**	**gpm**	**mgd**	**af/yr**	**gpm**	**mgd**	**af/yr**	**mgd**
Dash Point								
Flowing #1	C49D	25	0.04	33				
Flowing #3	C50D	5	0.01	7				
Flowing #5	C51D	100	0.14	115				
Flowing #6	C52D	100	0.14	115				
DP#1	C5632A Cert.-chg. I-2-91	250	0.4	313.6[f]	270	0.4	139	
DP#2	C159A Cert. chg. I-2-92	400	0.6	200	350	0.5	139	
DP#3	C5656A Cert.-chg. I-2-90[g] Cert.-chg. I-2-89	250 200	0.3 0.4	300 313.6[f]	350	0.5	139	
TOTAL Dash Point Wells		1,330	2.03	470	970	1.4	417	0

NOTE: See Legend at the end of this table.

Table STA 2-27. Continued.

		Water Right Allocation			Developed Capacity[a]			Current, Sustained Withdrawal Rate
Water Right	**Permit or Certificate**	**gpm**	**mgd**	**af/yr**	**gpm**	**mgd**	**af/yr**	**mgd**
North Fork Wellfield[d]	G1-00469C	58,300[d]	84[d]	30,244[f,d]	50,000	72.0	21,500	72.0
Tide Flats #1	G2-27023C	1,050	1.5	740 100[f]	750	1.1	358	1.0
Tide Flats #2	G2-28279P	1,300	1.9	1,400[f]	Not Developed			
Frederick-son #1	G2-28977P	1,000[i]	1.4	1,075[i]	Not Developed			
Gravity Wells #1 and #2	C7318A	6,400	9.2	5,120[f]	6,040	8.7	3,380	8.0
Mason Gulch Wellfield	23894P	1,400	2.0	1,130[h]	Not Developed			
Portland Avenue	G2-23895C	1,200	1.7	1,130[h]	1,200	1.7	339	1.7
TOTAL WELLS		11,350	17.7	3,000	57,990	83.5	25,577	82.7

Table STA 2-27 Legend

gpm = gallons per minute
mgd = million gallons per day
af/yr = acre-feet per year
[a]Maximum historic instantaneous flow rate and annual production that have occurred.
[b]The following wells have been abandoned since the 1987 Comprehensive Plan: Wells 1A, 2A, 7A, 8A, 10A, 10B, UP6, and UP7.
[c]Two certificates were issued for each of wells 1B through 8B. The second certificate is only for additional annual use (af/yr).
[d]North Fork water right is only to be used in place of Green River surface water diversion; it does not add to the total rate or quantity of water rights.
[e]Maximum of 755 ac-ft/yr under both rights.
[f]Supplemental water right. Annual quantity not adding to primary rights.
[g]Certificate of change issued to add fifth well and allow pumping from all five wells in amount of 200 gpm and 300 ac-ft/yr. This is not consistent with total of four flowing well certificates.
[h]Total annual use under all rights shall not exceed 111,000 af/yr or 0.5 ac-ft/capita, whichever is greater.
[i]Supplemental water right specific to Gravity Wells water rights.

STA 2-28

Comment noted. See General Comment Response 4.

STA 2-29

Comment noted.

STA 2-30

Refer to DEIS subsection 4.4, Cumulative Effects, which analyzes various land use plans within the Green River Watershed, Physiographic Province, and western Washington region and the combined effects of such plans on each of the proposed Covered Species. Also see General Comment Response 30 for a description of how the Cumulative Effects analysis was augmented in the FEIS.

STA 2-31

Tacoma acknowledges that should this third alternative be further pursued, a change in point of diversion would need to be processed.

STA 2-32

Comment noted.

STA 2-33

Tacoma Water is complying with RCW 90.03.383 (Interties—Findings—Definitions—Review and Approval) in the following ways:

- The existence of Tacoma Water's 22 interties with other water systems is consistent with the Washington State Legislature's recognition of the value of interties for improving the reliability of public water systems, enhancing their management, and more efficiently utilizing the increasingly limited water resource.

- Tacoma Water has filed written notice of its 13 nonemergency interties with the Departments of Health and Ecology.

- **#** The delivery of water to wholesale water users through Tacoma Water's 13 interties with wholesale customers improves overall water system reliability, enhances the manageability of the water systems, provides opportunities for conjunctive use, and delays the need to develop new water sources.

- **#** The water transferred to other systems through the 13 interties is within the instantaneous and annual quantities specified in its permits and rights.

- **#** The interties, and proposals for interties, have been incorporated into Tacoma's Water System Plan. Approval of Tacoma Water's interties is currently under discussion with Ecology**.**

STA 2-34

Comment noted.

STA 2-35

Comment noted.

STA 2-36

The geographic area Tacoma Water proposes to serve with its Second Supply Project is currently under discussion with Ecology. In general, the area includes South King County, the Seattle service area, the City of Tacoma, and portions of Pierce County in the vicinity of the City of Tacoma.

STA 2-37

Tacoma Water developed its Water Curtailment Plan in 1987 in response to that year's drought. The plan provides a guide as to when and how water use should be curtailed during droughts and water system operating emergencies. Since its development, it has been implemented in 1987 and 1992.

The plan consists of four stages of drought/emergency conditions. Depending on the severity of the emergency/drought condition, Tacoma Water may implement one or more stages of the plan. Each stage will be implemented depending upon the storage and drought predictions or the magnitude and anticipated duration of the emergency. Following is a brief outline of the

streamflow, groundwater storage, conservation actions, and implementation plan associated with each stage.

Stage I, Minor Drought/Storage Condition, or Minor Loss of Source Capacity

When the Howard Hanson Reservoir has a below-normal amount of storage based on records of previous years and/or the available groundwater supply is projected to be less than normal, Stage I of the Water Curtailment Plan will be initiated. Groundwater will be used to supplement the surface water supply system. Minor loss of source capacity, such as several wells, could also cause Stage I to be initiated.

Public awareness will be initiated through news releases. These news releases will explain the situation at hand and request that customers use water wisely and implement voluntary conservation measures such as efficient lawn sprinkling. Requests will also be made to parks, golf courses, and cemeteries to use efficient watering techniques.

Suggested conservation measures will include lawn sprinkling during early morning and evening hours and application of reduced amounts. Assistance to other utilities will only be considered where similar or greater use restrictions have been imposed.

Stage II, Moderate Condition

When the Green River flow is less than 75 percent reliability to meet 110 cfs from Howard Hanson Dam, or the available groundwater supply is more significantly limited, whether due to low water tables or loss of supply due to pollution of the aquifer, Stage II of the Water Curtailment Plan will be initiated.

Actions will be taken by Tacoma Water to reduce system usage, including curtailment of main flushing, street flushing, reservoir skimming and cleaning, and temporary hydrant usage. The public will be required to limit lawn sprinkling and eliminate nonessential outdoor water use. Assignment of odd-even days for sprinkling may be implemented. Social pressure and mutual surveillance at the neighborhood level can be relied on to effectuate this. Enhancement of Wapato Lake will be discontinued. City water fountains will be turned off. The Simpson Tacoma Kraft Company will be held to its contractually nominated flow and will be asked to implement all possible voluntary reductions. Wholesale customers will be advised of the restrictions imposed on customers. All actions of the previous stage will remain in effect.

Stage III, Critical Emergency

Streamflows will most likely be below the present conservation flows provided by the USACE from Howard Hanson Reservoir. The volume of water available for the surface water supply will be limited, and extensive use of the groundwater system will be required.

Another critical situation would be if the majority of the groundwater were to become contaminated or unavailable, and the river water was the only remaining available major source of supply. During the summer, the available supply under this condition could generally be 70 to 75 mgd, or even less if the river flow is extremely low.

Preventing waste or unnecessary use of water is critical at this stage. If necessary the water supply to Simpson Tacoma Kraft will be curtailed as operating conditions dictate. Outdoor usage of water will be eliminated. Assistance to other water utilities will take place only if the ability to meet Tacoma's own system's critical needs are not impaired. Water pressure within the distribution system may be reduced. All actions of the previous stage will remain in effect.

Stage IV, Major Catastrophe

This situation would arise as a result of a major catastrophic event such as an earthquake. Critical situations include the loss of Howard Hanson Dam, destruction of the transmission mains, or loss of McMillin Reservoir.

Maintaining water service is critical at this stage. Reduced system pressure will occur. Intermittent supply to parts of the City may be available associated with a "boil water" order. Commercial and industrial water use would be curtailed except for essential services such as hospitals. All actions of the previous stage will remain in effect.

STA 2-38

Comment noted. See General Comment Response 4.

STA 2-39

Comment noted.

STA 2-40

Copies of Tacoma's Water Rights and Claims are a matter of public record, and are kept on file at the Ecology. The list of Tacoma's Water sources and the amount of water used from each source is presented in Specific Comment Response STA 2-27.

STA 2-41

The Services note that Tacoma has acknowledged the need to address the question of water rights for water withdrawn from aquifer storage as well as water rights for water injected into aquifer storage.

STA 2-42

Tacoma is currently working with Ecology staff to address this issue of place of use.

STA 2-43

Tacoma acknowledges the need to address a water right change if it moves its diversion point or adds an additional point of withdrawal.

STA 2-44

Comment noted.

STA 2-45

The need for a storage right permit is being discussed between Tacoma Water, the USACE, and Ecology. If it is determined that a storage right is required, Tacoma will make such an application.

STA 2-46

Comment noted. See revised FEIS Volume I, subsection 2.2.3.1.

STA 2-47

Comment noted.

STA 2-48

Tacoma has indicated that discussions with the USACE and representatives of Ecology indicate that such a reservoir permit will not be required. However, if it is determined that such a permit is necessary, Tacoma will make application.

STA 2-49

A description of each conservation measure, and supporting rationale and environmental benefits associated with each measure, is provided in HCP Chapter 5.

STA 2-50

A description of each conservation measure, and supporting rationale and environmental benefits associated with each measure, is provided in HCP Chapter 5.

STA 2-51

Comment noted.

STA 2-52

Tacoma Water is applying for an ITP to cover, among other things, any incidental take of Covered Species it might cause on its lands in the Upper Green River Watershed. The ITP would also cover certain Tacoma Water activities on adjacent federal lands administered by the USACE (see HCP subsection 2.6 for a complete list of covered activities). The ITP would not, however, cover the actions of Tacoma Water or any other party on the remaining lands in the upper watershed. Consequently, Tacoma Water's HCP makes no commitments as to the future condition of those other lands. It is not necessary for Tacoma Water to acquire additional lands in the upper watershed to adequately mitigate for the anticipated incidental take and to meet the ITP issuance criteria of ESA Section 10. It would be inappropriate, therefore, for the Services to require Tacoma Water to acquire such lands as part of the HCP.

STA 2-53

Implementation of the HCP is likely to result in a net decrease in the total miles of roads on the Covered Lands, although the amount of reduction would not be known until assessments required by the HCP are completed. Habitat Conservation Measure 3-03B requires Tacoma Water to assess erosion hazards associated with roads on the Covered Lands, and to develop plans for maintenance, improvement, or abandonment of roads where necessary to reduce road sediment input rates to less than 50 percent of the estimated natural background sediment production rate. Habitat Conservation Measure 3-03I requires Tacoma Water to abandon roads in the upper watershed that are no longer needed to access the Covered Lands and/or adjacent lands, to properly manage the watershed, to conduct forestry operations, and/or to implement all aspects of the HCP. This measure is intended specifically to benefit water quality and fish habitat, and it is anticipated the measure would result in the abandonment of a number of road segments.

STA 2-54

Comment noted.

STA 2-55

The scope of Tacoma Water's HCP analyses of the effects of its activities extended from the headwaters of the Green River to the upper extent of the saltwater estuary. In addition, the Services are reviewing potential cumulative effects of Tacoma Water's activities within the context of broader geographical boundaries in the EIS. Potential cumulative effects were analyzed for the Covered Lands, at the basin-wide scale as defined by WRIA 9, and within a larger geographical unit labeled the Southwest Cascades Physiographic Province (see FEIS Volume I, subsection 4.4, Cumulative Effects).

STA 2-56

The commenter did not include sufficient information to allow us to discern the intent of the phrase "complete plan." Tacoma Water did not include detailed analyses of the effects of its water withdrawals on fecal coliform levels in the Green River since fecal coliform was not expected to affect the Covered Species.

STA 2-57

The Services will determine whether Tacoma Water's proposed conservation measures and monitoring activities are adequate to minimize and mitigate the impacts of its activities. Criteria for issuance of a permit for incidental taking are described in HCP subsection 3.2, HCP Requirements. The potential interaction of Tacoma Water's actions with the actions of other parties in the Green River Basin are addressed in FEIS Volume I, subsection 4.4, Cumulative Effects.

STA 2-58

The text within the EIS refers to the diversion of the White River to reduce flooding in the lower Green River valley in 1906, and the diversion of the Black River when Lake Washington was lowered by construction of the Ship Canal/Ballard Locks in 1916. In general, flow diversions allow salt water to extend farther upstream into river mouths. However, the movement of the saltwater wedge in estuaries is affected by the complex interaction of streamflow, tidal fluctuations, channel modification, water temperature, and other factors. While the diversion of the Black and White Rivers affected the upstream extent of salt water, predicting the effect of these and other more recent diversions on the upstream extent of the salt water in the lower Green/Duwamish River is beyond the scope of the HCP analyses.

STA 2-59

See General Comment Response 14.

STA 2-60

Tacoma's commitments to minimum flows on the Green River will require mandatory curtailment at the City of Tacoma prior to lowering Green River flows to the minimum allowed, 225 cfs, at the Auburn gauge. This can be tracked by all interested parties through Internet information regarding minimum instream flows on the Green River.

STA 2-61

The Proposed Action described in the EIS includes conservation measures that meet or exceed instream flow levels established under Chapter 173-509 WAC. The Services do not believe it necessary to examine the effects of the alternative suggested by the commenter since it would provide less resource protection than the Proposed Action.

STA 2-62
See General Comment Response 16.

STA 2-63
Comment noted.

STA 2-64
The Services are unsure of the meaning of this comment and can, therefore, not respond.

STA 2-65
See General Comment Response 17 for a discussion of increasing instream flows to provide additional protection for fish and other aquatic resources, and see General Comment Response 26 regarding adaptive management provisions of the HCP.

STA 2-66
The original authorization for Howard Hanson Dam did include water supply in its intent. There appears to be a difference of opinion within Ecology regarding whether a reservoir permit is needed to store water for water supply. The USACE firmly believes that a reservoir permit from the state is not needed. If it is determined that such a permit is required, then Tacoma will take steps to secure the necessary permit.

STA 2-67
See General Comment Response 26 regarding adaptive management provisions of the HCP.

Tacoma Water's HCP addresses and includes the City's commitments for monitoring its activities (compliance monitoring) and the impacts that may result from those activities, as well as the effectiveness of conservation measures (effectiveness and research monitoring). The HCP does not address additional compliance monitoring that may be conducted by the Services. Applicants create HCPs, and once accepted by the Services, guide the actions of the permittee. As such, HCPs do not specify the monitoring actions the Services will conduct. The IA establishes the authority of the Services to conduct compliance inspections as outlined in 50 CFR 13.47. The Services believe that Tacoma Water's HCP adequately addresses monitoring to the extent required for permit issuance.

The Western Washington Office of the USFWS has established a Branch of Monitoring and Evaluation with primary responsibility for monitoring the compliance of HCP permittees. The Services will prioritize the attention it gives to various HCPs during monitoring by: 1) the level of risk associated with the activities, 2) the extent of the activities, 3) the degree to which monitoring results can be factored into adaptive management, and 4) the vulnerability of the affected resources. The Services have many projects competing for attention; however, we are confident that each HCP permittee will receive an appropriate amount of oversight.

STA 2-68

It is agreed that Ecology needs to be made aware of a *force majeur* event as soon as possible and will need to be provided with anticipated actions by Tacoma and/or the USACE to respond to the event.

STA 2-69

If take of a newly listed species/habitat not covered by the HCP were to occur as described in the comment, Tacoma would have the option to: 1) alter its activities to avoid take, 2) modify its HCP, or 3) risk prosecution for a ESA section 9 take violation.

STA 2-70

Comment noted.

STA 2-71

Comment noted.

STA 2-72

Comment noted.

STA 2-73

It is difficult to predict to what extent past and current watershed management actions by Tacoma Water on its landholdings in the upper watershed have affected the temperature of water flowing into Howard Hanson Reservoir. Since Tacoma Water's lands provide the unfiltered surface water supply to the City of Tacoma, timber production was of secondary importance to

that of providing high quality water. The intensity of forest management on City-owned lands was constrained by the overriding need to protect the quality of this surface water supply (Ryan 1996).

STA 2-74

Recent changes in the forestry management activities of landowners in the Upper Green River Watershed, including the federal and state governments and Plum Creek Timber Company, as well as proposed changes by Tacoma Water, should result in an improvement in riparian protection. Over the proposed term of Tacoma Water's HCP, these riparian protection measures should reduce water temperature excursions related to forestry management practices.

STA 2-75

See Specific Comment Response STA 2-66.

STA 2-76

See Specific Comment Response STA 2-66.

STA 2-77

Comment noted.

STA 2-78

Tacoma has currently utilized its First Diversion Water Right claim up to a maximum annual withdrawal of 80,050 acre-feet.

STA 2-79

The additional language requested by the commenter relates to the history of water rights in the Green River Watershed. Since the suggested language does not directly address, and does not appreciably add to the understanding of the effects of Tacoma's Proposed Action under the ITP, we do not believe the additional language is necessary.

STA 2-80

The Services understand that application for water rights for the proposed hatchery for the Muckleshoot Indian Tribe will occur early in the permitting process for the hatchery.

STA 2-81

Tacoma has indicated that it does not believe that the commitments made on Page 5-13 of the HCP will require rulemaking to ensure implementation. It does not involve a deviation from established instream flow requirements, but instead applies to conditions under which Tacoma will voluntarily curtail the use of its First Diversion Water Right claim to support instream flows on the Green River.

STA 2-82

The decision to use different curtailment methods would evolve throughout the implementation of the HCP and development of the future source of supply in Tacoma. The HCP assures the public that curtailment would be implemented by Tacoma prior to lowering streamflows below a certain level. The provision of a 30-day window ahead of a decision on water curtailment or lowering stream flow to 225 cfs at the Auburn gauge is based on the ability to determine whether such action is likely to be necessary. Tacoma has stated that it seems unlikely that the need to lower streamflows to this extent will be clear more than 30 days in advance.

STA 2-83

Tacoma agrees that adjustments in the water right requirements and conditions would apply to it's partners in the Second Supply Project as well as to Tacoma Water.

STA 2-84

See Specific Comment Response STA 2-66.

STA 2-85

Tacoma Water and the Services recognize that hardwood conversion through clearcut harvesting may not be appropriate in riparian areas. For that reason, HCM 3-01E clearly states that "Hardwood conversion will not occur in no-harvest riparian buffers."

STA 2-86

The responses of the Services and Tacoma Water to the various circumstances described by the commenter are as follows:

New Scientific Information

See HCP subsection 3.2.2,Unforeseen Circumstance and No Surprises.

New State Law

The Services cannot give Tacoma Water, or any other ITP Applicant, an exemption from state regulations.

TMDL Listing

See HCP subsection 3.3.3, Clean Water Act.

New Listed Species

See HCP subsection 3.2.4, Changes in the Status of Covered Species.

Green River Flow Management Committee

A description of the Green River Flow Management Committee is provided in HCP subsection 5.2.2, Howard Hanson Dam Non-dedicated Storage and Flow Management, Howard Hanson Dam Operation: Increased Storage Under the Additional Water Storage Project.

STA 2-87

Comment noted.

STA 2-88

See Specific Comment Response FED 1-8.

STA 2-89

Tacoma has not yet made formal application to amend the instream flow rules. Amendment of the rules is not necessary to implement the HCP, but has been recommended by Ecology to provide surety that a junior water right holder will not be able to use water that is not available to Tacoma because of the City's agreements to higher instream flows.

STA 2-90

See Specific Comment Response FED 1-8.

STA 2-91

See General Comment Response 14 for a discussion of the operation agreement between Tacoma Water and the USACE. As the commenter notes, Howard Hanson Dam is a federal facility operated by the USACE. The Section 10 ITP being requested by Tacoma cannot cover operation of Howard Hanson Dam. Coverage under the ESA for operation of Howard Hanson Dam is being pursued by the USACE through the Section 7 ESA process.

STA 2-92

Comment noted.

STA 2-93

The Services cannot give Tacoma Water, or any other ITP Applicant, an exemption from state regulations such as the Washington Forest Practices Rules. If state rules include provisions for accepting approved HCPs in lieu of conformance with specific regulations for the management of riparian areas and roads, it would be up to Tacoma Water and the appropriate state agencies to determine whether or not its HCP satisfied those provisions.

STA 2-94

This comment regarding inspection of forest practices throughout the watershed does not appear to be an HCP issue. Tacoma has indicated it does not take issue with agents from Ecology inspecting Tacoma Water operations in the Green River Watershed for compliance with forest practices.

Comment Responses to Washington Department of Ecology (STA 3)

STA 3-1

See General Comment Response 31.

Northwest Indian Fisheries Commission

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March 31, 2000

Tim Romanski
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APR 03 2000
U.S. FISH & WILDLIFE SERVICE
LACEY WA OFFICE

Matt Longenbaugh
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510 Desmond Drive, Suite 103
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Dear Sirs,

The following are my comments on the proposed Tacoma Water Habitat Conservation Plan (HCP)

Yours Truly,

Bruce Davies

COMMENTS ON THE TACOMA WATER HCP

1. Protection of Tribal Treaty Uses

In a recent letter Assistant Secretary for NOAA, Terry Garcia stated that:

> "Our statement of the twin goals for salmonid populations listed under the ESA recognizes that the United States, and all federal agencies, stand in a trust relationship with all federally recognized Indian tribes and of the responsibilities that flow from that relationship. The federal trust obligation to Indian tribes is independent of the statutory duties of the federal agencies and informs the way such statutory duties are to be implemented. The United States Supreme Court has described certain characteristics of the trust relationship and the lower courts have implemented the trust in specific situations. Hence, we understand the importance of the federal government's efforts to allocate the conservation burden for salmonids listed under the ESA in such a way that, among other things, it does not discriminate against tribal fishing rights and is implemented in the least restrictive manner. Accordingly, the tribes may reasonably expect, as a matter of policy, that tribal fishing rights will be given priority over the interests of other entities, federal and non-federal, that do not stand in a trust relationship with the United States."

1

Recognition and enforcement of this trust duty is especially important in regards to the Tacoma Water HCP as it allows incidental take of fish that were traditionally harvested during tribal treaty harvests. Thus this allocation decision may result in a reduction of tribal treaty rights.

To protect tribal uses, the following language should be incorporated into section 15.8 of the Implementation Agreement.

> "Nothing in the Tacoma Water Habitat Conservation Plan, the Implementation Agreement or associated documents nor the Incidental Take Permit shall in any way affect or limit, or be deemed an adjudication of any Indian Treaty right reserved by Treaty, Executive Order or Statute; nor the ability of any Tribe, Federal Agency or Department, including the National Marine Fisheries Service to take any action to enforce, support or protect such Indian reserved right."

2

2. The HCP Does Not Address all the Uses Authorized by the HCP.

The HCP handbook states that:

> "HCP applicants should be encouraged to consider as large and comprehensive a plan area as is feasible and consistent with their land or natural resource use authorities" (HCP Handbook, p. 3-10).

3

The Handbook also states that:

> "Generally, applicants should be encouraged to include as comprehensive a set of activities in the HCP as is practicable."

The HCP states that Tacoma Water intends to divert up to 113 cfs of water from the Green River under its First Diversion Water Right for municipal and industrial water uses for "the city of Tacoma and surrounding communities". Tacoma also plans to exercise its Second Diversion Water Right (SDWR) of up to 100 cfs for these uses (HCP, p. 2-1).

The HCP notes that Tacoma intends to construct and operate the Second Supply Pipeline (SSP):

> "Construction of the SSP will allow diversion and transmission of an additional 100 cfs of water from the Green River to the Tacoma Regional Water Supply Area, including southern King County, to meet future water needs." (HCP, p. 2-9)

3

The HCP notes that under Phase II, the capacity of Howard Hanson dam will be increased but that:

> "Phase II activities are not covered by this HCP. A separate ESA review of Phase II will be conducted after mitigation for Phase I is determined adequate.
>
> Under Phase I... up to an additional 20,000 ac-ft of municipal and industrial water will be stored in the spring for release during the summer and fall to supply up to 100 cfs (65mgd) for Tacoma's SDWR" (HCP, p. 2-13)

Therefore the HCP indirectly acknowledges that activities covered by the ITP include water withdrawals associated with the First Diversion Water Right and the Second Diversion Water Right (SDWR) and the application of the withdrawn water to municipal and industrial uses. The HCP also recognizes that the water withdrawals authorized by the HCP will be distributed regionally to support future development. Therefore, the incidental take coverage provided by the HCP authorizes water withdrawal that will be used to supply existing regional industrial and municipal uses and future growth.

However, the HCP does not address the take of listed species that will occur as a result of anticipated uses of the withdrawn water. Instead the HCP focuses only on the set of activities that impact instream flow in the Green River mainstem, that impact a narrow riparian corridor along the Green River and that impact Tacoma Water's land above Howard Hanson dam.

4

The plan area also is narrowly drawn. It only includes the riparian corridor and Tacoma Water's land above the dam. The plan area does not include the land area affected by the proposed uses of the withdrawn water. As a result, the most significant environmental impacts on listed species of the withdrawals authorized by this HCP are nowhere addressed in the HCP.

As will be described below, the water withdrawals authorized by this HCP are a key element of a much larger regional water supply project. Without the need to satisfy the larger regional water demand, the increased diversions probably could not be justified because there would not be sufficient demand for the level of water withdrawals authorized by the HCP.

Determining the real scope of the proposed action is difficult because Tacoma and other participants in the regional water supply project have impermissibly compartmentalized the permitting stages for the overall project. As a result, the environmental impact analyses of the various stages of the project have also compartmentalized the cumulative effects of the overall project. To determine the real scope of this HCP, one must consult several different documents. The Tacoma Water HCP, the Tacoma Water HCP DEIS, The Proposed Second Supply Project Agreement DEIS and the Central Puget Sound Regional Supply Water Outlook.

The Second Supply Project Agreement DEIS states that the agreement includes several key provisions, including the following:

- The agreement would allocate water diverted from the Green River under Tacoma's Second Diversion Water Right among various participants, with Seattle Public Utilities (SPU) receiving one third of the water, Tacoma Water receiving one third of the water and participating south King County utilities receiving the remaining one third.
- Infrastructure improvements would occur, including construction of the Second Supply Pipeline to connect the Tacoma water supply system to southern King County and to the SPU water supply system.
- The agreement would allocate Howard Hansen storage to the three participating groups and establish rules for pooling each utilities' storage at the dam. (Second Supply DEIS, p. S-3)

Based on this agreement SPU estimates that the firm yield of its water supply system would increase by 14 mgd. (Second Supply DEIS, p. S-4).

In addition to the south King County utilities that are parties to the agreement, numerous other utilities in the region would benefit from the regional supply system. The DEIS states that SPU, besides providing water to customers in its service area, also provides water to 27 wholesale customers (cities, water districts and other jurisdictions) that, in turn, sell water to individuals and businesses within their service areas. A partial list of these wholesale customers is set forth in Exhibit 1.

Tacoma Water admits in the HCP DEIS that the water authorized for diversion by the HCP is intended to serve a regional water supply system:

> "The Full Regionalization scenario considers Tacoma Water as a regional water supplier, and contains a larger number of variables than the Local Reliance

scenario. In addition to Tacoma Water's own demands, the demands of other entities were considered…

Tacoma Water has decided to move forward with the Full Regionalization scenario. The Washington State Departments of Health and Ecology have expressed support of the Full Regionlization scenario as a means to meet the future water demands of the Puget Sound area. Based on the results of the Integrated Resource Planning model and other supporting factors such as the need for Tacoma Water to either implement or lose the Second Diversion Right, Tacoma has proceeded with the first elements in the Full Regionalization Scenario. These include plans to build the Second Supply Pipeline and the
7 Howard Hanson Dan Additional Water Storage Project." (HCP DEIS, p. 1-10)

This statement indicates that Tacoma does not have sufficient present or near term future demand in its' service area to fully utilize the Second Diversion Water Right. Therefore it has decided to participate in the Regional Supply System as a way to market the surplus water and thereby perfect this water right. Participation in the regional supply system is the only way Tacoma can establish the pumps and pipes capacity and usage levels that it needs to establish actual beneficial use of the Second Diversion Water Right. It is therefore clear that the primary purpose of the HCP is to allow Tacoma Water to market its' second diversion water to the regional water system that is being constructed.

The Central Puget Sound Regional Water Supply Outlook Technical Memoranda and Progress report (Feb. 2000) provide additional information on usage and transmission
8 supply system upgrades. It notes that Tacoma has already begun construction of the Second Supply Pipeline and provides a map of the projected regional water transmission system. The map is attached as Exhibit 2.

Mandatory elements of an HCP include information identifying the impacts that are likely to result from the proposed activities for which coverage is requested. This HCP is inadequate because limits both the plan area and the activities authorized by the HCP to only a portion of the overall project. It fails to address the impacts of the regional water
9 system that is created and the growth that is authorized as a result of this HCP. It is as if a developer submitted a plant to subdivide and develop a large parcel and the HCP only addressed take that would result from constructing the roads in the subdivision and did not address other impacts, such as septic systems.

3. <u>The HCP does not Minimize or Mitigate the Impacts of Water Usage</u>.

An HCP must also include measures the applicant proposes to minimize and mitigate the
10 impacts that are likely to result from activities authorized by the HCP.

In discussing the scope of activities covered by an HCP, the Handbook notes that:

"Of course, not participating in the responsibilities of the HCP also means not enjoying the benefits of protection from the incidental take prohibition…"(Handbook, p. 3-13)

10 This policy determination by the Services means that, if only water withdrawal is addressed in the HCP, then usage of the water is not covered by the HCP take exemption. Therefore transfers to the regional supply system and, indeed, any actual distribution or use of the water, other than mere withdrawal, is not authorized by the HCP if mitigation and minimization measures for these uses are not addressed in the HCP.

The HCP DEIS discusses in passing some potential conservation standards that could
11 reduce the environmental impacts of increased water use (page 2-12 to 2-24) but there are no commitments in the HCP to implement these conservation strategies.

More importantly both the HCP DEIS and the HCP recognize that the remaining salmonid habitat in the Green River watershed is limited to the middle and lower basins
12 of the Green River. The estuary has been heavily urbanized and access to the upper reaches is blocked by Howard Hanson dam. The HCP proposes reseeding the upper reaches as one of the mitigation measures but the productivity of the upper reaches is unknown at this time. Therefore most of the incidental take of existing salmonid populations will occur in the middle reaches.

The HCP DEIS recognizes that growth in this area is likely to impact salmonid habitat. The DEIS notes that high temperatures in the lower and middle basin probably result from solar heating. The factors responsible for this adverse impact on salmonid habitat include extensive paving in the lower basin and the lack of shade. (HCP DEIS, p.3-20) The DEIS also notes that the lower basin has undergone extensive urbanization and the middle basin is currently in the process of conversion from agricultural to urban land use (HCP DEIS, p. 3-57). The DEIS acknowledges that:

"Developed lands are associated with the greatest changes in aquatic habitat quantity
13 and quality. Under current conditions, 25 percent of WRIA 9 is urban or residential land and that proportion is expected to increase by up to 10 percent in the future, largely as a result of conversion of agricultural lands in the lower basin… Moreover, streams crossing Developed and Agricultural lands include much of the mainstem Green River and low gradient tributary streams, channel types that are preferred by many of the covered species. Aquatic habitats will be provided increased protection under King County's Sensitive Areas Ordinance, thus the direct effects of future development on covered fish species are expected to be less than those observed historically.

In addition to the historic wetland conversions and channel simplification associated with urbanization and associated flood control projects, development alters the hydrologic regime. Although there has been no quantitative analysis of flow alterations in the mainstem green River as a result of urbanization, data from the Soos Creek and Newaukum Creek gauges indicate that peak flows have increased and

summer low flows have decreased as a result of development in those basins. The effects of growth on stormwater will be at least partially mitigated by more stringent regulations required under King County's Stormwater Management Policy…" (HCP DEIS, p. 4-205)

Under the Washington State Growth Management Act, development can only occur after the local government with permitting power determines that public services such as roads, water and sewer, can support the new growth. Therefore the provision of water supplies by Tacoma Waters is a legal precondition for anticipated growth that will impact listed species. Tacoma Water attempts to avoid legal responsibility for take that will result from uses of water will supplies to support that growth by stating that:

13 "…Tacoma's service of water from the Green River system is in response to the growth-related service requirements identified by the Growth Management Act. In the state of Washington therefore, the distribution of water does not induce growth but rather responds to the growth needs previously identified through a statewide process and specifically allocated by units of government planning under the Growth Management Act." (HCP DEIS, p. 4-97)

However this argument avoids the more important issue. The Services cannot rely on uncertain future local jurisdiction decisions to provide mitigation for the take that will occur as a result of development encouraged and made possible by the water supplied by Tacoma Water.

The claim that Tacoma Water is not responsible for third party uses of the water and therefore need not address those uses in the HCP also cannot withstand scrutiny. In a recent letter by the Attorney General of Washington dated January 21, 2000, the Attorney General interpreted Strahan v. Coxe, 939 F. Supp. 963 (D. Mass. 1996) and Loggerhead Turtle v. Volusia County, 148 F.2d 1231 (11th Cir. 1998) to mean that the ESA prohibits third parties from enabling someone else to take a listed animal. In a footnote the
14 Attorney General reiterated her interpretation that these cases stand for the proposition that a governmental entity can be held responsible under the ESA for a third party's action that ultimately leads to a take.

Since Tacoma Water and the other utilities participating in the regional water supply system are public entities involved in providing public services, they are as responsible as other governmental entities in ensuring that their activities to do not promote take by their customers. Therefore the HCP needs to set forth a strategy for minimizing and mitigating the uses of the Tacoma Water withdrawals authorized by the HCP.

4. The HCP and EIS fail to quantify the amount of take that is being authorized

15 The Endangered Species Habitat Conservation Planning Handbook, (Nov. 1996) states that :

"In determining the amount of incidental take that will be authorized during the life of the permit, three things must be determined: (1) how incidental take will be calculated; (2) the level of incidental take and related impacts expected to result from proposed project activities; and (3) the level of incidental take that the section 10 permit will actually authorize." (Handbook, p.3-14)

The Handbook also states that:

"...it is now Service policy to begin integrating the section 7 and section 10 processes from the beginning of the HCP development process and to regard them as concurrent and related, not independent and sequential processes." (Handbook, p.3-16)

15 The Services have stated that the baseline condition of the species, including the "percent or amount of the species" range in the action area must be quantified in making jeopardy decisions under section 7 (Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7..., March 1998, p 4-22).

The Services have also recognized the need to specify the overall conservation needs of a listed species in evaluating a proposed action affecting that species. For example, in the Draft Addendum to the HCP Handbook the Services state that, in setting HCP objectives "the overall conservation needs of the covered species and/or its habitat" must be considered. 64 Fed. Reg. 11485,11486 (1999).

The Services have also recognized the need to quantitatively and qualitatively assess the effects of a planned action. The HCP Handbook provides that, before approving an HCP, the HCP must quantify anticipated take levels for each of the covered species (HCP Handbook, p. 3-10).

The following basic information was not included in either document:

16 - Baseline conditions of the species: The documents fail to estimate either current or baseline habitat conditions and productivity of that habitat on a stock or population specific basis. The documents also fail to estimate how the additional risk and potential take may impact that habitat and productivity.
17 - Conservation needs of the Species: The documents fail to estimate the amount and quality of habitat that is needed to provide sufficient productivity to ensure the survival of listed salmonids, on a stock or population specific scale. The problem is especially acute in regards to ensuring survival of critical stocks.
18 - Effects of the HCP: The documents fail to estimate the amount and quantity of habitat changes, the impact of these changes on productivity and the resulting sizes and numbers of populations that will remain after the direct, indirect and cumulative effects of the HCP are considered.

Without this factual information in the administrative record, the Services lack sufficient information on which to quantify the amount take of salmonids that might occur as a result of HCP authorized activities. Without this estimate, the Services have no factual basis for determining the amount of take that they are authorizing. This in turn means that the Services do not have a basis for determining that take authorized by the HCP is not likely to jeopardize listed species. Therefore the Services do not have a basis to find under CFR 222.22(c) (iii) that the taking will not appreciably reduce the survival of the species.

19

By failing to make basic quantitative and qualitative assessments of baseline conditions, effects of the HCP and conservation needs, the Services could not rationally connect the facts before it. The Services cannot tie an HCP authorizing habitat loss and incidental take, with a finding that survival and recovery chances of covered listed species will not be diminished by the HCP.

5. The EIS Does Not Analyze the Cumulative Impacts of the Water Withdrawals

The Second Supply DEIS recognizes that the water supplied by the Green River intertie will support increased growth:

> All of the alternatives considered in this EIS would either increase water supplies to SPU's water service area or reduce the rate of demand growth. The proposed Agreement would also increase supplies to unincorporated areas of south King County and the cites of Kent, Federal Way, Des Moines and Auburn…these actions could contribute to accelerated growth, to the extent that inadequate water supplies would otherwise constrain growth in those areas." (Second Supply DEIS, p. S-12)

In its analysis of indirect and cumulative effects, the Second Supply DEIS states that:

20

> "Other indirect impacts to stormwater discharges and surface water quality could result in some areas to the extent that additional water supplies allow for an increase in development relative to No Action. This effect would be most likely to occur within portions of designated Urban Growth Areas where inadequate water supplies would otherwise prevent development permits from being issued. … Similarly, if increased development increases the amount of impervious surface in a localized area, it could result in localized increases to peak stormwater discharges and localized degradation of surface water quality. (Second Supply DEIS, p. 2.2-33)

The HCP DEIS in contrast does not even provide a limited discussion of the cumulative effects of the impacts of increased water use and the development supported by the increase in water supplies. There is no discussion of the impacts in the Tacoma Water service area or impacts in the SPU service area. No analysis is conducted of the cumulative impacts of the Regionalization Plan that is made possible by the Green River withdrawals.

Much of the information needed to conduct such a cumulative effects analysis is readily available. The Central Puget Sound Regional Water Supply Outlook includes a technical memorandum entitled Population and Demand Supply Forecast. This document is based on regional economic and demographic projects prepared by the Puget Sound Regional Council combined with individual utilities' current water use. Based on this information the memorandum identifies baseline demands and forecasts future demands for forecasting areas that are as small as Transportation Analysis Zones for the years 2000, 2010 and 2020. Exhibit 3 sets forth one page of the baseline forecast for February 24, 2000 by TAZ.

21

Since population, use levels and other baseline data is available, Tacoma could compare these projections with existing delineated urban growth areas within each TAZ in order to determine estimated levels of urbanization in each TAZ. Land use classifications, building code provisions and transportation plans in each TAZ could also be compared to these growth projections to identify the cumulative impacts of the expected urbanization in terms of the effects of increases in impermeable surfaces, stormwater and land clearing and conversions.

22 The HCP DEIS is inadequate because it fails to address the cumulative effects of growth that will occur because of the increase in water supply that is authorized by the HCP.

Exhibit 1

- A 30-year term with a 15-year notice of intent to renew (which Seattle did not exercise at the end of 1996).

These long-term water supply contracts are set to expire at the beginning of 2012.

TABLE 2.7-1
SPU'S WHOLESALE WATER CUSTOMERS

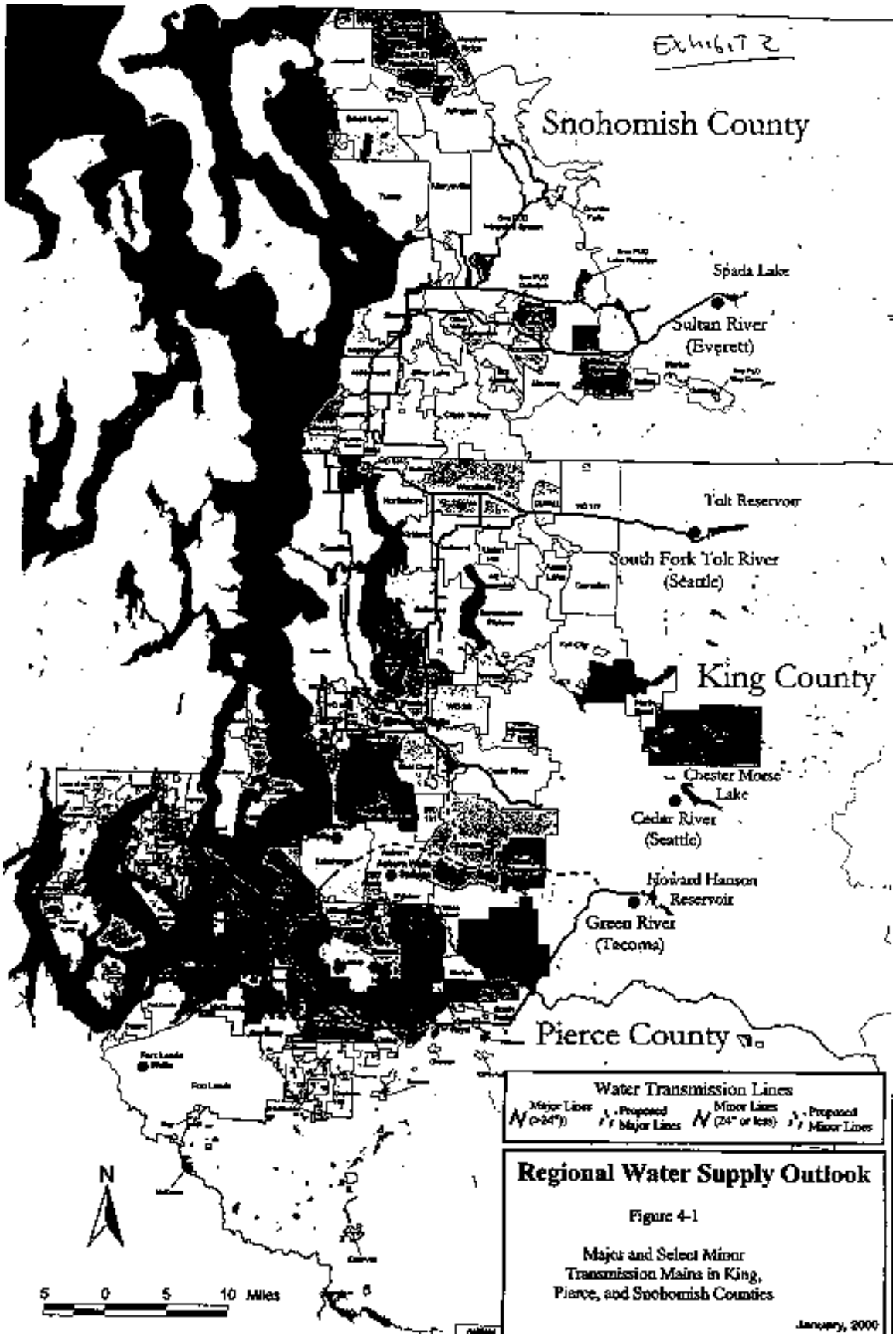
City of Bellevue	King County Water District 119
City of Bothell	King County Water District 125
Bryn Mawr-Lakeridge Sewer and Water District	City of Kirkland
Cedar River Water and Sewer District	City of Mercer Island
Coal Creek Utilities District	Northshore Utility District
City of Duvall	Olympic View Water and Sewer District
City of Edmonds	City of Redmond[1]
Highline Water District	City of Renton[2]
King County Water District 20	Shoreline Water District
King County Water District 45	Skyway Water and Sewer District
King County Water District 49	Soos Creek Water and Sewer District
King County Water District 83	City of Tukwila
King County Water District 85	Woodinville Water District
King County Water District 90	

[1] Signed contract in 1987
[2] Renton has a long-term water supply contract with Seattle signed in 1998, but is not a member of SPU's purveyor committee.

Starting in 1992, representatives from Seattle, the Suburban Cities Association, and the King County Water District Alliance (the "Tri-Caucus"), met to develop a new institutional arrangement for meeting the region's future water supply needs. The final Tri-Caucus "Principles of Agreement," adopted in August 1995, provided for the creation of a new regional organization – the Cascade Water Alliance (CWA) – that would be responsible for meeting the future water supply needs of its members. Membership would be open to all jurisdictions in urban King County (except Seattle).

Under the "Principles of Agreement," Seattle would develop the Proposed Agreement and transfer it to CWA, but would no longer develop any other significant new sources of water supply, unless they are ancillary to other investments such as water quality improvements, or are requested by CWA. Seattle would, however, continue to own and operate its existing water supply/transmission system and would sell its excess firm yield on a take-or-pay basis to CWA under a new long-term contract. Under the "Principles of Agreement," Seattle would continue to serve any remaining purveyors until their existing contracts expire at the beginning of 2012. At that time, remaining purveyors would either obtain Seattle water through CWA, develop new sources of their own, or disincorporate and become direct service customers of Seattle.

SPU subsequently negotiated terms of a potential future water sales contract with the Cascade Water Alliance. These terms would have committed Seattle to provide water



Regional Water Supply Outlook

Figure 4-1

Major and Select Minor Transmission Mains in King, Pierce, and Snohomish Counties

January, 2000

Table C-3 ~ Baseline Peak Day Demand Forecast
February 24, 2000

Utility	Peaking Factor	Peak Day Demand in Million Gallons per Day		
		2000	2010	2020
County: King				
Algona	2.50	0.91	0.94	1.01
Ames Lake	2.00	0.54	0.70	0.90
Auburn	1.97	16.06	17.26	18.46
Bellevue	2.01	29.63	31.38	32.84
Black Diamond	2.50	0.54	0.61	0.61
Bothell	1.94	3.05	3.26	3.32
Bryn-Mawr	1.45	0.74	0.81	0.92
Carnation	2.48	0.59	0.69	0.70
Cedar River	2.25	4.19	4.72	5.01
Coal Creek	2.51	5.42	5.89	6.71
Covington	2.20	8.95	9.83	10.16
Duvall	2.03	0.73	1.06	1.21
Enumclaw	2.50	7.68	8.20	8.27
Fall City	2.36	1.12	1.90	2.05
Highline	2.50	17.56	18.45	19.84
Issaquah	2.50	3.46	3.74	4.17
KC Smaller Utilities & Private Wells	2.00	21.75	22.41	22.48
Kent	1.77	15.22	15.85	17.41
King 1	2.01	0.07	0.07	0.07

Note: The Outlook demand forecast is regional in scope and may not capture specific details for some individual utilities. Individual utilities' forecasts that were reported in the Outlook survey or are contained in their comprehensive water plans should also be consulted.

Exhibit 3

MUCKLESHOOT INDIAN TRIBE

FISHERIES DEPARTMENT

APR 24 2000

LACEY, WA
RECEIVED

March 31, 2000

Ms. Anne Badgley
Regional Director
US Fish and Wildlife Service
911 NE 11th Avenue
Portland, OR 97232

Mr. William Stelle, Jr.
Regional Director
National Marine Fisheries Service
7600 Sand Point Way NE
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Mr. John Kirner
Deputy Superintendant
Tacoma Water
3628 South 35th Street
Tacoma, WA 98409-3192

RE: December 1999 Public Review Draft of the Tacoma Water Habitat Conservation Plan for the Green River Supply Operation and Watershed Protection January 2000 Draft Environmental Impact Statement for the Proposed Issuance of a Multiple Species Incidental Take Permit for the Tacoma Water HCP

Dear Ms. Badgley and Messrs. Stelle and Kirner:

The Muckleshoot Indian Tribe (MIT) appreciates the opportunity to submit comments on the December 1999 Public Review Draft of the Tacoma Water Habitat Conservation Plan (HCP) for the Green River Supply Operation and Watershed Protection. The Tribe also reviewed and submits comments to the January 2000 Draft Environmental Impact Statement (DEIS) for the Proposed Issuance of a Multiple Species Incidental Take Permit (ITP) for the Tacoma Water HCP.

1 The Tribe is presenting new information and comments addressing flow regime and Tacoma Water Activities in the upper watershed of the Green River as technical corrections. The Tribe stands by the 1995 Agreement between the Muckleshoot Indian Tribe and the City of Tacoma regarding the Green/Duwamish River System (TPU/MIT Agreement), to the extent that it is in effect.

We have organized our comments below, starting with general comments, followed by page-specific comments on the HCP and page-specific comments on the DEIS. Please feel free to contact me if you have any questions.

Sincerely,

Chantal Stevens
Environmental Division Manager

39015 172nd Avenue Southeast • Auburn, Washington 98092 • (253) 931-0662 • FAX (253) 931-0752

p.3	General Comments
p.6	Page Specific Comments - Public Review Draft, Tacoma Water HCP
p.14	Page Specific Comments - DEIS for Tacoma Water HCP
P.19	Comments on DEIS Discussion of Sediment Sources and their Environmental Consequences –
Attachment A:	(1) Permit For FPA 2405693, (2) Letter From MIT dated 24 February 1999, (3) Letter From WDNR dated 15 March 1999
Attachment B:	June 15, 1998 MIT Comment letter to AWSP HHD and November 30, 1998 MIT comment letter to Final Feasibility Report and EIS for AWSP HHD

General Comments

2 Many of the measures of this proposed HCP and its DEIS rely on whether or not, and under what terms, a future Incidental Take Permit will be issued to the Army Corps for the Additional Water Storage Project (AWSP). This uncertainty and the interrelated nature of these proposals suggest that federal review of the Tacoma Water HCP at this time is premature.

3 The HCP should justify why the HCP action area and ITP area stop at the upstream extent of tidal influence. The amount and timing of freshwater inflows influences the position of the salt wedge in the Duwamish Estuary, which in turn influences the distribution of estuarine and brackish vegetation and the distribution of juvenile salmon, particularly chinook and chum. Additional spring storage will reduce freshwater inflows to the estuary during the period of chinook estuary utilization. These impacts must be evaluated.

4 The Tribe remains concerned that the expanded reservoir storage objective of Phase I AWSP is in conflict with project ecosystem restoration objectives, and that adaptive management and proposed conservation measures cannot effectively resolve this conflict. Despite the positive, cooperative nature of Green River interagency coordination for flow management during the last several years – anadromous fish protection is already difficult to achieve during and immediately after spring reservoir refill. For example, almost every year, steelhead redds become dewatered and juvenile salmon are trapped in side channels, while other losses are less obvious (e.g. outmigration survival) and are not accounted for.

Specifically, we are concerned that the storage burden under Phase I AWSP will expand from 25,400 acre-feet up to 49,200 acre-feet every year despite (1) large inter-annual variations in Green River runoff; (2) anticipated adverse effects of storage on salmon and steelhead which are not prevented by the provision of minimum instream flows. The range of potential adaptive management actions taken in response to proposed experimentation and monitoring are limited by and subordinate to inflexible municipal and dedicated storage targets. Potential measures such as artificial freshets, and the storage and use of non-dedicated storage, could aggravate existing tradeoffs in survival between species and seasons, and between fish resources in the upper and lower Green River watershed already inherent in the existing Howard Hanson Dam (HHD) project. For example, artificial freshets could both strand juveniles in downstream side channels at the same time it helps others to emigrate.

5 Benefits to fisheries resources under the proposed AWSP reservoir and flow management strategy are by no means a certainty. During the spring refill season, accounting for dedicated and non-dedicated storage volumes will be more perplexing in real-time than it appears on paper using hindsight modeling. Paradoxically, the intent of the non-dedicated storage proposed under the AWSP is to use even more storage to try to mitigate the adverse effects of increased storage during springtime on fish resources by attempting

to reshape runoff over the course of the spring and early summer. It is fair to say that it will not be easy to generate consistent benefits for fish, especially since the use of hindsight is impossible during the refill season. It is more likely that the existing interspecies/life stage tradeoffs will be aggravated, especially between chinook and
5 steelhead. While the maximum refill rates and the target baseflows offer some protection compared to historic HHD operations, everyone involved would acknowledge that the baseflows do not fully protect downstream fish resources. Many, if not most of the productive off -channel habitats in the middle Green River are disconnected from the main river even under the proposed wet condition target baseflow (900 c.f.s.) at the Auburn gage.

To address these concerns, the tribe suggests an open technical discussion on of the potential use of flexible municipal storage targets that would vary with water
6 supply/runoff conditions, and (2) the potential for increased flexibility to respond to unforeseen fish protection needs under certain circumstances, such as additional voluntary cutbacks on regional consumptive water use during drought.

A healthy instream ecosystem is dependent upon not only minimum flow protection, but on preserving and protecting natural flows in terms of frequency, amount and timing. It should be noted that the IFIM model, as used by Caldwell and Hirschy in 1989, would no longer be viewed as a complete assessment of the instream flow needs of chinook or
8 other salmonids in the Green River, and the method itself has been heavily criticized in the scientific literature for years following its development (Castleberry et al 1996). Moreover, field studies on the Green River since Caldwell and Hirschy 1989 (e.g., Coccoli 1996, R2 Resource Consultants, unpub.) indicate that many important off-channel habitats in the middle Green River which are heavily used by salmon are unprotected by minimum flows and are wetted only at higher flow levels.

Boulders placement is not and appropriate surrogate for large woody debris in stream restoration. Given the historical loss of instream wood due to previous timber harvest or alienation of the channel migration zone, the quantity and volume of wood in the Green River and its tributaries is well below that which would otherwise occur. Thus, in the Green River, the contribution of boulders to the creation of certain types of salmonid habitat appears to be greater than it would be otherwise. Many analysts have failed to take this into account and concluded that many streams need more boulders in order to
9 improve habitat, and thus, boulders have often been used for restoration projects rather than wood. Boulders should not be used for instream restoration unless the stream segment in question would naturally be expected to have boulders and the volume and frequency of wood in the stream segment is that expected of an unaltered stream. Boulders should not be used as a surrogate for wood based on the argument that they are cheaper, easier to place, or more convenient. Compared to wood, boulders produce volumes of low velocity water needed by rearing juvenile salmonids over a smaller range of flows. If stability is an issue, wood structures of sufficient size or mass should be used. The proposed language allows boulders to be placed into streams where human activity has created a rock dominated situation not natural to the most of the Green River.

10 The Monitoring and Research Program outlined in Chapter 6 is insufficient to determine the benefits of the HCP. Threshold standards for implementing a contingency plan need to be stated in the HCP rather than developed afterwards.

11 The Proposed Second Supply Agreement between Tacoma, several South King County utilities and Seattle should be discussed in more detail relative to Tacoma's contemplated Incidental Take action. The Agreement is only addressed in Chapter 9, in which other alternatives are discussed. The Agreement includes provisions for various storage options related to AWS and the share each Agreement participant would receive. For example, Seattle and Tacoma have an agreement for shared storage behind Howard Hanson dam. A more detailed discussion of this issue along with potential flow
12 management options for the Green River under various climatic conditions would be helpful to obtain a "big picture approach". We believe this is necessary, especially as the
13 two projects, Tacoma's HCP and Seattle's Proposed Second Supply Agreement DEIS, have undergone almost simultaneous public review.

14 Chapter 9 evaluates several other alternatives to the proposed incidental take contemplated in the HCP if the AWS project does not go forward. For these alternatives, the statement is made that implementation of these other alternatives would result in the loss of benefits to fish associated with the project. As stated in our general comments, any benefits to salmonids from AWS is uncertain at best. The Tribe is concerned that expanded storage associated with the AWS projects conflicts with ecosystem and salmonid restoration objectives and will exacerbate the already difficult tradeoffs between harming fish resources during existing spring reservoir storage in order to meet fish flow augmentation needs later on in summer/fall.

15 Finally, we agree with Tacoma Water that Phase II activities are not to be covered by this HCP and on the need to conduct a separate SEPA review for Phase II only after mitigation for Phase I is determined adequate.

Page Specific Comments - Public Review Draft, Tacoma Water HCP

16	p. 2-8	ln. 9	Watershed analysis is conducted for Watershed Administrative Units (WAU) rather than for sub-basins. Watershed Analysis has only been completed for the Lester WAU. The analyses undertaken for Upper Green and Sunday Creek have not been approved through SEPA. Therefore, formal prescriptions exist only for one of the WAUs.
17	p. 2-12	ln. 3	This line should be modified to make it clear that Phase II storage will only proceed with the approval of the resource agencies and MIT.
18	p. 2-14	ln. 8	See general comments on boulder placement
19	p. 2-15	ln. 14	Water flow improvements are included as a main feature of the HCP but no support or description of these improvements is provided. What provisions are actual improvements, and what conditions do they improve upon? The difference between "flow improvement" and mitigation of the effects of diversion, i.e. minimum instream flows, should be clarified. The tradeoffs between spring storage and for summer/fall flow augmentation should be described and acknowledged.
20	p. 3-5	ln. 36	If a major fire occurs and culverts are found to be undersized, the time required to replace them may be excessive and the stream channel subject to the potential of debris flows if material accumulates on the upsteam end of the culvert and bridge. To reduce the probability of this occurrence, Tacoma Water should proactively upgrade all stream crossings to a size considered appropriate to pass any anticipated volume in flows, gravel and wood.
21	p. 3-6	ln. 25	This condition gives Tacoma Water the ability to remove a considerable amount of wood from stands less than 100 years old, a large percent of land covered by this HCP. Toppled trees of less than 100 years in age, can still be quite large and individually or collectively alter channel hydraulics in a manner that creates salmon habitat. Removing toppled trees is an unmitigated impact reducing a future source of wood recruitment from lateral channel erosion, landslides and the like. To minimize the impact of salvage logging in this stands, HCM 3-01F should be modified to read that: A. no salvage logging will occur in the channel migration zone; and B. trees that have entered in whole or part the stream channel shall not be salvaged.

22	p. 3-7	ln. 2	3.2.3.3 Landslide See comments regarding Watershed Analysis and mass wasting in DEIS comment section.
23	p. 4-5	ln. 28	A lack of listing upon the Clean Water Act 303(d) list does not mean that applicable water quality standards are being met. If a stream fails to meet applicable standards, but the stream is not monitored, then the stream will not be considered for inclusion on the 303(d) list. MIT surveys have often found streams that fail to meet applicable temperature standards.
24	p. 4-8	ln. 19	Though the proposed riparian buffers may be greater than those of standard forest practices as well as rules under current consideration, the HCP present no analyses if the proposed Tacoma Water buffers will provide adequate shade.
25	p. 4-8	ln. 27	Water quality below Howard Hanson Dam is affected by sediment released from the Reservoir when the Green River entrains sediment from the fine sediment accumulating in the pool. For example on 6 January 1999, MIT biologists observed clear water entering Howard Hanson Reservoir and extremely turbid water leaving. The turbidity extended downstream to at least river mile (RM) 36. In August and September 1999, MIT biologists collected fine sediment samples from the Green River between Flaming Geyser State Park (RM 44) and Soos Creek (RM 34). Fine sediment concentrations in the river averaged 17.2%. It is likely that turbidity-laden flows from HHD are a chronic source of fine sediment to the Green River.
26	p. 4-9	ln. 6	The HCP reports that water temperatures can exceed 16°C. Temperatures in excess of 16°C are considered exceedances of applicable water quality standards. The HCP should note then that water temperatures entering the reservoir reach and exceed levels considered detrimental to salmonids. Given that turbidity (p. 4-11 ln. 3) is reported to exceed water quality standards, then the Green River above HHD fails to meet water quality standards for two major parameters of import to salmonids. The HCP should indicate why these exceedances of temperature do not warrant listing under the 303(d) list.
27	p. 4-11	ln. 3	P 4-9, ln 6 indicates water temperatures also exceed standards. See also comments to p. 4-8, ln 27. Some discussion is required as to relationship between turbidity released from behind HHD and the observed high levels of fine sediment in downstream spawning areas.

28	p. 4-11	ln. 13	This statement should be supported by citation.
29	p. 4-17	ln. 2	Due to a lack of available data, the model used to approximate natural flow conditions on the Green River (CH2M Hill, 1997) did not consider the effects of forest practices and other human activities on watershed hydrology and streamflow. As acknowledged in the Draft HCP, these factors might be expected to influence the flow regime. It is probable that the flow data used in the model reflect an altered watershed hydrology (higher peak flows and lower baseflows) due to the cumulative effect of historic and recent forest management, roading, groundwater withdrawals, loss of wetlands due to agricultural and other land development. These cumulative effects are all embodied in the 1964-1995 stream gage records. The HCP should explain the limitations of the natural flow estimates and subsequent analyses based on the CH2M Hill model and in relation to base and flood flows.
30	p. 4-41	ln. 38	The presence of main haul roads has similar impacts to the river in some locations as the BNSF Railway.
31	p. 4-42	ln. 1	It should be added that loss of riverbed migration has long term consequences for wood and gravel recruitment from the CMZ. Both wood and gravel quantities are reduced below the HHD and wood quantities above HHD are less than from unmanaged systems.
32	p. 4-44	ln. 5	The volume of large woody debris and the piece count entering the reservoir and collected on an annual basis should be stated.
33	p. 4-47	ln. 30	The HCP should note that such recreation interest have voiced opposition to the passage of wood from above HHD. Furthermore, the HCP should note that habitat protection and recovery takes priority over recreation in the Green River channel.
34	p. 4-49	ln. 19	For the years 1997 through 1999, the proportion of the mainstem spawning Green River chinook spawning below the Soos Creek boat ramp, just upstream of Soos Creek, ranged from 10% to 31%. For the same years, the percent of the mainstem run spawning downstream of RM 29.6 (within downtown Auburn) ranged from 1.5% to 11%. These values do not support a statement that the lower Green river was exclusively used by juvenile salmon.
35	p. 4-50	ln. 14	Though the bulk of the spawning falls within the stated time period, chinook redds have been observed in the Green River Gorge in the first week of September.

36	p. 4-53	ln. 10	In 1998, MIT biologists observed adult chum at RM 48 and in 1999 at RM 56, an area at the upper extent of the Gorge, suggesting chum salmon could reach the Tacoma Water diversion Dam. The upstream spawning distribution of chum salmon is undefined and appears to have expanded along with larger run sizes in the last few years.
37	p. 4-71	ln. 25	Historic diversion of the White and Black river channel should be discussed separately, as the impacts upon chinook and chinook habitat in the Green River differs. Diversion of the White River did not influence the entire Lower Green River. The full effect of diversion of flows from the Black and White diversions (30% reduction of summer flows) is experience by the Green-Duwamish below the Black River, while the Tacoma Water diversions affect both the area between the Black and the White diversion and to a greater extent the Lower Green River above its historic confluence with the White River.
38	p. 4-71	ln. 29	Since that report was prepared, freshwater discharged into the Duwamish River from the Renton Treatment Planted has been diverted directly into Elliott Bay, thus during the low flow season less freshwater is in the Duwamish River and as a result the salt wedge can extend beyond RM 11.
39	p. 4-73	ln. 2	The statement that "summer flows have increased over historic conditions" as a result of Howard Hanson Dam should be clarified. Readers might mistakenly conclude that HHD improved summer flow over natural or pristine conditions, which is not true (e.g., Burkey 1999). HHD storage has increased summer flows compared only to the foregone period from 1913 to 1961 when the City's diversion routinely depleted Green River streamflow during summer and fall
40	p. 4-73	ln. 11	Though mentioned on p. 4-82, it should also be stated here that the dam has also interrupted the downstream movement of wood.
41	p. 4-73	ln. 33	The statement of increased flood flows should be supported by a citation and the calculated increase stated.
42	p. 4-79	ln. 28	A volume should be stated for Headworks diversion dam sediment storage and the potential increase in storage if the Headworks is raised. Preliminary calculations suggest that gravel storage behind the Headworks can exceed the annual volume of gravel Tacoma Water is proposing to place into the Green River. Given the observed

42 downstream gravel shortages and perceived downcutting in portions of the river, it is important the HCP provide an accurate history and discussion of potential future impacts of Tacoma Water influences upon gravel movement and recruitment to downstream reaches.

43 p. 5-19 HCM 1-02 The 1995 MIT/TPU flow agreement increased the IRPP minimum instream flow requirements during summer and fall months for exercise of the SDWR in order to reduce the adverse effects of diversion on salmon resources. While the state and TPU/MIT minimum instream flow requirements offer some protection for fish, existing natural flows in the Green River are generally much higher than these agreed minimum instream flow requirements particularly during winter and spring months. It should be recognized that a healthy instream ecosystem is dependent upon not only minimum flow protection, but on preserving and protecting natural flows in terms of frequency, amount and timing. It should be noted that the IFIM model, as used by Caldwell and Hirschy in 1989, would no longer be viewed as a complete assessment of the instream flow needs of chinook or other salmonids in the Green River, and the method itself has been criticized in the scientific literature for years (Castleberry et al 1996). Field studies on the Green River since Caldwell and Hirschy 1989 (e.g., Cocoli 1996, USACE 1998) have shown that many off-channel habitats in the middle Green River which are heavily used by salmon are not protected by the minimum flows.

44 p. 5-21 ln. 32 The MIT has repeatedly expressed concerns regarding the existing quality of salmon habitat above HHD. See comments in attached letters submitted on the Additional Water Storage Project.

45 p. 5-25 ln. 12 See previous comments regarding boulders.

p. 5-26 ln. 27 See previous comments regarding boulders.

p. 5-28 ln. 9 See previous comments regarding boulders.

46 p. 5-31 HCM 2-02 Benefits to fisheries resources under the proposed AWSP reservoir and flow management strategy are by no means a certainty. Accounting for and effective use of dedicated and non-dedicated storage volumes during spring refill may be even more perplexing in real time than what is described based on hindsight modeling. Paradoxically, the intent of non-dedicated storage is to use more spring reservoir storage to mitigate the known adverse effects of dedicated spring storage on upper watershed and downstream fish resources by attempting to manipulate and reshape runoff over the

46 course of the spring and early summer. It will not be easy to generate any consistent benefits for fish, especially since the use of hindsight is impossible during the refill season. It is likely that the existing seasonal and inter-species/life stage tradeoffs will be aggravated, especially between chinook and steelhead. While the maximum refill rates and the target baseflows offer some protection compared to historic HHD operations it should be acknowledged that these baseflows do not fully protect downstream fish resources. Many, if not most productive side channel habitats in the middle Green River are disconnected from the main river at even the wet condition target baseflow (900 c.f.s.) at the Auburn gage.

47 p. 5-49 ln. 35 See previous comments regarding boulders.

p. 5-52 ln. 36 See previous comments regarding boulders.

48 p. 5-61 ln. 31 Infrequent, but large scale events can be responsible for much of the wood found in channels. If an unusually large supply of wood enters to the reservoir due to an unusual natural event, such as a major landslide, then reserving the right to reduce the percent of wood delivered downstream will only serve to further decrease the quantity of wood downstream. To address this natural variability in wood loading, no restrictions should be placed upon downstream wood placement. Unusually high volume is undefined. Criteria for wood to be considered LWD under this measure should be clearly specified.

49 p. 5-62 ln. 23 If wood is not used due to appeals from boater interests, then Tacoma Water could reduce wood allocated to downstream passage. Additionally, as the placement of wood is contingent upon permits issued by other entities, a contingency mitigation plan is required in case Tacoma Water cannot place the wood. This measure needs to be included in the final HCP.

50 p. 5-67 ln. 33 The use of the term "place *up to* 3,900 yd^3" (emphasis added) does not compel Tacoma Water to place any gravel at all. The HCP should stipulate that unless the stated amount is placed, additional mitigation measures are required. These mitigation measures need to be developed and specified in the HCP. Additionally, as the placement of gravel is contingent upon permits issued by other entities, a contingency mitigation plan is required in case Tacoma Water can not place the gravel. This measure needs to be included in the final HCP.

51 p. 5-67 ln. 36 The Tribe does not agree that the preferred location is RM 45.0. A large number of chinook spawn upstream of RM 45. Tacoma Water should allocate some gravel for placement upstream of the Gorge.

52 p. 5-70 ln. 20 See previous comments regarding boulders.

p. 5-71 ln. 26 See previous comments regarding boulders.

53 p. 5-78 ln. 9 A danger tree should be defined. Additionally, the wording here implies that trees as far away as 150 can reach the road. It is interesting that the road is considered to have a recruitment zone for wood wider than many of the streams covered by this HCP.

54 p. 5-82 ln. 15 This condition gives Tacoma Water the ability to remove a considerable amount of wood from stands less than 100 years old, a large percent of land covered by this HCP. Toppled trees of less than 100 years in age, can still be quite large and individually or collectively alter channel hydraulics in a manner that creates salmon habitat. Removing toppled trees is an unmitigated impact reducing a future source of wood recruitment from lateral channel erosion, landslides and the like. To minimize the impact of salvage logging in this stands, HCM 3-01F should be modified to read that:

A. no salvage logging will occur in the channel migration zone; and
B. trees that have entered in whole or part the stream channel shall not be salvaged.

55 p. 5-89 ln. 22 Harvest on Unstable Slope
See comments on DEIS section.

56 p. 5-94 Table 5-2 The impact of excluding trees landward of roads and right-of-ways from the buffer should be calculated in terms of recruitment of wood volume of piece count, and mitigation measures defined.

57 p. 5-101 ln. 15 Road Maintenance
See comments on DEIS section.

58 p. 5-108 ln. 2 Stream Crossings
Streams crossing should be designed to pass downstream wood and gravel. See comments to p. 3-5, ln 36.

59 p. 5-111 ln. 2 Road Abandonment
Tacoma Water is proposing a measure to which they must have the agreement of adjacent landowners. Contingency measures to achieve the same result need to be specific in case Tacoma Water can not reach agreement with landowners.

60	p. 7-5	ln. 26	The HCP should not rely upon an IFIM study conducted more than ten years ago. A review of USGS data indicates that the channel of the Green River has changed greatly since. Tacoma Water is relying upon incorrect information to justify the HCP's impacts and benefits. Additionally, since the preparation of the IFIM, there is no evidence that Tacoma Water has groundtruthed the assumptions regarding chinook spawning habitat preferences.
61	p. 7-26	ln. 1	Roads. See comments in DEIS comment section.
62	p. 7-30	ln. 26	The HCP states that flows at 225 cfs provide passage depths of one foot or greater. However, MIT surveys in August at 297 cfs and in September of 1999 over a series of randomly selected riffle crests between RM 44 and 34 found that the average water depth was 0.73 ft with a standard deviation of 0.24 feet.
63	p. 7-40	ln. 3	The actual percent fines should be stated. Additionally, see previous comments re fine sediment concentrations in the Middle Green.
64	p. 7-42	ln. 23	The statement that chinook require a minimum of 1 foot of water to spawn is not supported by citation in the HCP. Additionally, surveys conducted by the MIT in 1999, found 26% of the sampled chinook redds in less than 1 foot of water.
65	p. 7-44	ln. 30	In 1999, approximately 30% of the mainstem spawning chinook spawned in the Lower Green. Given broad assumptions the anticipated 15% reduction in potential spawning habitat would influence around 4.5% of the mainstem spawning chinook run.

Page-specific Comments - DEIS for Tacoma Water HCP

See also comments regarding the DEIS discussion of sediment sources and their environmental consequences starting on page 19.

66 Figure 2-1 — The map does not accurately depict the "USFS Boundary" in the Green River basin.

67 p. 2-46 ln. 2-3 — The statement fails to indicate the "agreements" to which it refers, prohibiting an evaluation of their beneficial or detrimental impacts in the DEIS. If the statement refers to the 1995 MIT/TPU agreement, please note that Appendix B of Tacoma Water HCP omits Section 7 of that agreement, namely "WATER QUALITY AND HABITAT PROTECTION FOR THE UPPER WATERSHED OF THE GREEN RIVER – STEWARDSHIP PROGRAM." The DEIS should specifically describe (1) the "agreements for habitat enhancement" to which it refers, (2) the beneficial or detrimental impacts of actions that would follow from such "agreements," (3) Tacoma Water's record on implementing such "agreements" to date, (4) the likelihood that such "agreements" will be implemented in the future, and (5) the timeframe over which such "agreements" will be implemented. The discussion should refer to each element of Section 7 of 1995 MIT/TPU agreement, including "7.3 Tacoma Water to Share Information on Its Land Management Activities," "7.4 Cooperation in Upper Watershed Restoration," and "7.6 Tacoma Water to Monitor Compliance with State Forest Practices Requirements."

68 p. 2-46 ln.11-12 — Watershed analyses were initiated for the Upper Green, Sunday Creek, Smay Creek and Howard Hanson watershed administrative units in 1996 or earlier. The DEIS should indicate the specific date each of the four watershed analyses was initiated, and the material benefits, if any, of their status.

69 p. 2-46 ln. 28-29 — As depicted in DEIS Figure 2-5, "Upper Green River Watershed forest management zones," the "Natural Zone" apparently excludes lands owned by the Tacoma Water located along major tributaries to the Green River, including Champion Creek, Rock Creek, Sawmill Creek, Friday Creek, Snow Creek, Smay Creek, Sylvester Creek, and Cougar Creek. The DEIS should specifically describe the basis for eliminating such areas from the "Natural Zone" and why they differ from areas where "the potential to influence water quality is the greatest."

70	p. 2-50 ln.18-19	The state watershed analysis process does not identify "unstable soils."
71	p. 2-54 ln. 27-29	Tacoma Water is required to comply with state forest practices rules, including prescriptions from the state watershed analyses, whether or not it operates under Alternative B. Implementation of state forest practices rules will occur under Alternative A, the No Action Alternative. The DEIS should not consider implementation of state forest practices rules as an element of proposed action alternatives.
72	p. 2-59 ln. 6	No benefits result from the measure as proposed, which ensures nothing more than that someone will attend a meeting. To date, the Tacoma Water has participated in watershed analysis for five watershed administrative units in the HCP area. The City always supports prescriptions proposed by representatives from other forest land owners in the upper Green River basin, and its participation principally serves to advance the City's interests in commercial logging. Prescriptions supported by Tacoma Water allow logging roads to contribute 50 percent more fine sediment to streams than the streams receive from calculated "background" levels of surface erosion. No prescriptions supported by Tacoma Water prohibit road construction on unstable slopes.
73	p 2-59 ln. 7	This proposed measure appears to give Tacoma Water unlimited discretion to determine the level of road maintenance it will conduct on its lands. Binding criteria for road maintenance are required to the evaluate environmental benefits of a "Road Sediment Reduction Plan (e.g., no more than 50 feet of road length will contribute to a culvert that drains to a stream).
74	p. 2-59 ln. 8	This proposed measure appears to give Tacoma Water unlimited discretion to build roads. Slope stability analyses do not necessarily lead to sound road location or engineering. Binding criteria for road location and engineering are required to evaluate environmental benefits (e.g., no road construction on unstable slopes).
75	p. 2-66 ln. 5-6	DEIS Sections 2.4.1 and 2.4.2 make no mention of the "existing road agreements" referred to in DEIS Section 2.4.3.
76	p. 3-6 ln. 30-32	The statement is selective and misleading. Thousands of acres in the Green River basin have been opened to commercial logging as a result of USFS actions, including the Alpine Lakes, Tacoma Water, Huckleberry, and I-90 land exchanges. Moreover, during the 50-year term of the proposed HCP, the acreage "open to timber harvest activities" will decrease as a result of commercial logging in areas

76 that will not regenerate commercial timber during the term of the HCP.

77 p. 3-10 ln. 26-27 The statement describes conditions that are not evident along most of the upper Green River and the lower portions of its major tributaries such as Twin Camps Creek, Sunday Creek, Sawmill Creek, Smay Creek, Rock Creek, Champion Creek, Gale Creek, Charley Creek, and etc.

78 p. 3-18 ln. 24-27 The DEIS incorrectly attributes "turbidity increases" at the Tacoma headworks diversion to "high-flow events," rather than sources of fine sediment from which the turbidity results (e.g., logging roads, and landslides originating in clearcuts). The DEIS identifies sources of fine sediment impacting water quality in the lower Green River that cannot be mitigated by the proposed HCP. However, in the same section it fails to identify sources of fine sediment that could be mitigated by an HCP and contribute to "turbidity increases" at the Tacoma headworks diversion.

79 p. 3-22 ln. 23-31 The work discussed cannot be properly attributed to "Plum Creek Timber Company." Apart perhaps from chapters entitled "Introduction," Overview," Executive Summary," References," and "SEPA Checklist," Plum Creek Timber Company did not author any of the contents contained in the document entitled Lester Watershed Analysis, dated March, 1996, and bound by Plum Creek Timber Company, L.P., Seattle, Washington. The page inside the cover states "Prepared By: The Attached Resource Assessment Team and Prescriptions Team." Further investigation of the document indicates the chapter entitled "Surface Erosion Module" (the presumed source for the DEIS reference to "evaluation of fine sediment production") was prepared by Carol Coho, not Plum Creek Timber Company, L.P. Reference to work contained in Plum Creek Timber Company, L.P., ed., Lester Watershed Analysis, 1996, should specifically cite the chapter to which reference is made, and the author of the work cited.

80 p. 4-35 to 4-50 The DEIS does not discuss the effects of the Proposed Action on spring flows. We are very concerned about the effects of the additional water storage project on flows and fish habitat. This concern is expressed in our general comments as well as in our 1998 comment letter on the Additional Water Storage DEIS (attached). The Tribe remains concerned that the expanded Howard Hanson reservoir storage objective of both Phase I and Phase II AWSP is in conflict with project ecosystem restoration objectives, and that

80 adaptive management and proposed conservation measures cannot effectively resolve this conflict. Under the proposed HCP, this DEIS, and AWSP framework presented, adaptive management adjustments to reservoir refill operations and streamflow management would be constrained by and subordinate to inflexible municipal water storage targets, and the existing conservation storage needed to offset certain impacts of the Tacoma Water First Diversion. Despite the positive and cooperative nature of Green River interagency coordination for spring reservoir and flow management during the last several years – anadromous fish protection is already difficult to achieve. Almost every year during spring refill, steelhead redds become dewatered and juvenile salmon are trapped in side channels, while other losses are less obvious (e.g. outmigration survival) and are not accounted for. There is never enough water to fully protect all life stages and all species in all seasons. The tradeoffs involved between spring storage and for flow augmentation should be described and acknowledged.

81 In addition, the hydrographs presented in this section should also include flow changes anticipated from groundwater withdrawals in the Green River watershed. For example, the City of Auburn well fields in the Auburn valley are in hydraulic continuity with the Green. This is supported by Auburn's groundwater study. Auburn will likely expand groundwater withdrawals related to perfection of their water rights in the next ten years. The cumulative effects of these withdrawals, along with, at a minimum, those by other water districts and municipalities in the watershed should be accounted for. The effects of loss of groundwater recharge with urbanization and impacts associated with the loss of wetlands in the basin should also be included.

82 It must be acknowledged that benefits to fisheries resources under the proposed reservoir management strategy are by no means a certainty. Accounting for and effective use of dedicated and non-dedicated storage volumes during spring refill may be even more perplexing in real time than what is described based on hindsight modeling. Paradoxically, the intent of non-dedicated storage is to use more spring reservoir storage to mitigate the known adverse effects of dedicated spring storage on upper watershed and downstream fish resources by attempting to manipulate and reshape runoff over the course of the spring and early summer. It will not be easy to generate any consistent benefits for fish, especially since the use of hindsight is impossible during the refill season. It is likely that the existing seasonal and inter-species/life stage tradeoffs will be aggravated, especially between chinook and steelhead. While the

82 maximum refill rates and the target baseflows offer some protection compared to historic HHD operations it should be acknowledged that these baseflows do not fully protect downstream fish resources. Many, if not most productive side channel habitats in the middle Green River are disconnected from the main river at even the wet condition target baseflow (900 c.f.s.) at the Auburn gage.

83 The 1995 MIT/TPU flow agreement increased the IRPP minimum instream flow requirements during summer and fall months for exercise of the SDWR in order to reduce the adverse effects of diversion on salmon resources. While the state and TPU/MIT minimum instream flow requirements offer some protection for fish, existing natural flows in the Green River are generally much higher than these agreed minimum instream flow requirements particularly during winter and spring months. It should be recognized that a healthy instream ecosystem is dependent upon not only minimum flow protection, but on preserving and protecting natural flows in terms of frequency, amount and timing.

84 It should be noted that the IFIM model, as used by Caldwell and Hirschy in 1989, would no longer be viewed as a complete assessment of the instream flow needs of chinook or other salmonids in the Green River, and the

85 method itself has been criticized in the scientific literature for years (Castleberry et al 1996). Field studies on the Green River since Caldwell and Hirschy 1989 (e.g., Cocoli 1996, USACE 1998) have

86 shown that many off-channel habitats in the middle Green River which are heavily used by salmon are not protected by the minimum flows.

Comments on DEIS Discussion of Sediment Sources and their Environmental Consequences

Affected Environment

87 The description of the affected environment in **DEIS Section 3** presents a superficial, and in some case inaccurate account of turbidity and sediment sources in the upper Green River basin.

With regard to turbidity in the upper Green River basin, **DEIS Section 3.6.5** reports the following (numbers added for purpose of reference):

> [1] Evaluation of fine sediment production in the Green River by Plum Creek Timber Company (1996a) shows that sediment production increased from the period 1958-1967 to 1968-1978, but decreased from 1968-1978 to 1979-1995. [2] Plum Creek Timber Company (1996a) found that mass wasting was the largest source of fine sediment to the river. [3] Timber harvest and road construction increased dramatically in
> 88 several subwatersheds of the upper Green River Watershed in the late 1960s and early 1970s. [4] Large runoff events in association with these management activities are a likely cause of higher sediment production in the 1968 to 1978 period. [5] With recovery of vegetation and improved forest management practices, sediment production in the Green River Watershed has since been declining.

With regard to these statements as whole, note that they refer to "fine sediment production in the Green River." The work that they apparently intend to abstract (i.e., Coho, C., 1996, Surface erosion module, *in* Plum Creek Timber Company, L.P., ed., Lester Watershed Analysis: Plum Creek Timber Company L.P., Seattle, Washington, p. 4B-i to 4B-25, and appendix) only considers surface erosion in Lester watershed administrative unit (WAU), which is one of six WAUs comprising the upper Green River basin. The results of that work cannot be abstracted to encompass "fine sediment production in the Green River," or "turbidity" in the "Upper Green River Watershed," without reasonable discussion of the basis for such extrapolation, which the DEIS fails to provide.

With regard to reference 1, the DEIS cannot support its assertions about "fine sediment production in the Green River" based on discussions contained in the citation it provides.
89 Neither Reynolds (1996), nor Coho (1996), nor Metzler (1996) describe historical variations in fine sediment production in their respective analyses of mass wasting, surface erosion, and stream channels in the Lester WAU. The Introduction, Overview, or Executive Summary sections contained in the document the DEIS describes as "Plum

89 Creek Timber Company (1996a)" also provide no description of historical variations in fine sediment production. The DEIS should clarify its basis for attributing the indicated variations in fine sediment production to "Plum Creek Timber Company (1996a)."

90 Similarly with regard to reference 2, the DEIS does not support its assertion about the primary source of fine sediment in the upper Green River basin. Reynolds (1996) did not specifically analyze the amount of coarse or fine sediment delivered to streams by landslides in the Lester WAU. However, the annual amount of fine sediment delivered to streams by surface erosion was considered in detail by Coho (1996).

91 As reported by Coho (1996) in table 4B-3, the annual fines erosion volume (in terms of "T/KM^2/YR") from non-management-related landslide scarps ranges from only 0 to 15 percent of the adjusted annual background sediment yield for sub-basins within the Lester WAU. For management-related landslide scarps, the amount of fine sediment delivered to streams by surface erosion (in terms of "TONS PER KM^2/YR") in sub-basins within the Lester WAU ranges from only 0 to 50 percent of that delivered by all management-related sources (i.e., landslide scarps and roads), as indicated by Coho (1996) in table 4B-5. In terms of those numbers, fine sediment production from secondary erosion of landslide scarps clearly does not exceed either the background yield from non-management-related sources (i.e., soil creep on landslide scarps and colluvium-manteled slopes), or that produced by logging roads.

92 Furthermore, Coho (1996) overestimates the amount of fine sediment produced by secondary erosion of both management- and non-management-related landslide scarps. In each case, the reported values are calculated based on the total area disturbed by landslides that delivered debris to streams (see attached figure regarding the area of selected landslide features in the Lester WAU), rather than only that portion of the disturbed area where landslides have exposed colluvium on slopes. Stream channels account for most of the total area disturbed by landslides in the Lester WAU, whereas the area of colluvium exposed at landslide scarps and by landslide runout across open slopes is small in comparison (Reynolds, 1996). In addition, the annual amount of fine sediment delivered to streams by secondary erosion at landslide scarps should typically decrease over time as vegetation re-colonizes the areas denuded by evacuation of colluvial material at sites of landslide initiation. Coho (1996) does not consider such temporal decreases in the amount of sediment produced by secondary erosion at landslide scarps.

93 Contrary to the assertion in the DEIS "that mass wasting was the largest source of fine sediment to the river" (reference 2 above), the Executive Summary section in the document the DEIS describes as "Plum Creek Timber Company (1996a)" notes that "[s]econdary erosion from mass wasting scarps was generally <u>less</u> significant than road erosion, except for tributary basins with high levels of mass wasting such as Friday, Rock and Champion Creeks" (emphasis added). Moreover, the exception for basins with high levels of mass wasting is probably invalid, as explained above.

Coho (1996) calculated the annual amount of fine sediment delivered to streams by surface erosion along roads (including their associated cuts and fills) in the Lester WAU.
94 As indicated by Coho (1996) in appendix 4B, the "active mainline" road segment in the Lester WAU comprises only 3.7 percent of total road length in the area, but produces 31.6 percent of the total sediment delivered to streams by roads (in terms of "T/yr") as a result of surface erosion.

Note that Coho (1996) reports values of "total sediment delivered" in terms of "T/yr" in appendix 4B. Other values in that appendix are reported in terms of imperial units, and
95 the text of the report chiefly refers to "tons." However, metric units are reported in many cases throughout the report, which uses a "multiplier of 1.1 to convert cubic meters to metric tons." Because both imperial and metric units are used in the report, the units reported here are written as stated in the report, despite some uncertainty about whether they represent imperial tons or metric tonnes. Note also that the sum of "Road Length" reported for individual sub-basins in appendix 4B is about the same as that reported in Table 4B-2, 95.52 miles and 94.85 miles, respectively. However, the road classified in Figure 4B-4 as having "heavy" road traffic corresponds with the mainline haul road on the north side of the Green River, which appears to be about twice as long as the 3.55
96 miles of "active mainline" road segments described in appendix 4B. It is not clear whether the difference in reported lengths of "active mainline" and "heavy" road traffic road segments reflects differences in classification, "proportioning of traffic throughout the active and inactive times of the year," or possibly an error that would result in an underestimate of the sediment production from "active mainline" roads.

In any case, as indicated by Coho (1996), the road segments in the Lester WAU classified as "active mainline" contribute a substantial amount of the fine sediment delivered to streams from surface erosion along roads in the Lester area, despite their relatively small contribution to the total length of roads in the area. As noted in the Executive Summary section contained in the document the DEIS describes as "Plum Creek Timber Company
97 (1996a)," the "high erosion values in the upper Green River sub-basin [a sub-basin within the Lester WAU] were largely a result of the mainline road which generates large amounts of sediment due to heavy traffic levels." As indicated on DEIS figure 2-5, most of the mainline haul roads in the upper Green River basin [i.e., in the area upstream of Tacoma Water's diversion dam] are located on lands owned by Tacoma Water. This suggests that in proportion to the total length of road in the upper Green River basin, roads on Tacoma Water lands contribute a disproportionately large amount of the total sediment delivered to streams by surface erosion.

With regard to reference 3, the DEIS would appear to suggest that such practice ceased after the early 1970s, when in fact "[t]imber harvest and road construction increased
98 dramatically in several subwatersheds of the upper Green River Watersheds" well after the late 1960s and early 1970s (e.g., Canton, Sylvester, Cougar, Maywood, West Fork Smay, Sawmill, and North Fork Green River basins), in some cases partly as the result of the exchange of federal lands to private logging companies.

99 With regard to reference 4, the "likely cause" of sediment production in excess of that documented for earlier periods within the photographic record is not doubtful. For the period of about ten years prior to 1978, landslide inventories for the Lester WAU (Reynolds, 1996), the Upper Green and Sunday Creek WAUs (Krogstad and Reynolds, 1997) and the Howard Hanson and Smay Creek WAUs (Reynolds and Paulson, 1999), document substantial increases in "sediment production" in the upper Green River basin from landslides that originated at logging roads and slopes logged after 1958.

100 With regard to reference 5, the DEIS statement is not supported by any discussion or reference, and its assertions about the fact and cause of declining sediment production are not consistent with data on landslide frequency in portions of the upper Green River basin for which recent landslides have been considered. Based on analysis of aerial survey projects spanning the period 1962 to 1996, Reynolds and Paulson (1999) determined that the frequency of mapped landslides in the Howard Hanson and Smay Creek WAUs ranged from a low of 3.1 per year between 1978 and 1989, to a high of 16.1 per year between 1989 and 1996. The landslide frequency between 1989 and 1996 (16.1 per year) was 3.2 times that of the preceding 27 years (5.1 per year between 1962 and 1989), and the landslide frequency during the 18-year period between 1978 and 1996 (8.2 per year) was 1.3 times that of the preceding 16-year period (6.5 per year between 1962 and 1978). These data suggest sediment production in the Howard Hanson and Smay Creek WAUs has not declined since 1978, but has more likely increased.

101 With regard to the life history and habitat requirements for chinook, coho, chum, and sockeye salmon, **DEIS Section 3.8.1** fails to discuss or even mention the role of coarse or fine sediment.

With regard to the "historic influences" of roads and railroads on fish habitat conditions, **DEIS Section 3.8.2.1** fails to discuss or even mention surface erosion and landslide runout from logging roads.

With regard to current fish habitat conditions in the upper Green River watershed, the discussion of fine and coarse sediment in **DEIS Section 3.8.2.2** merely provides a litany of sweeping generalities, such as the following statements (emphasis added), which could be said for any basin in western Washington:

102

> "Forest practices <u>can</u> influence delivery rates of fine sediment…"
> "Fine sediments…<u>can</u> have detrimental effects…"
> "…growth of alevins <u>can be</u> reduced if fine sediment size fractions exceed…"
> "Low-gradient and mainstem spawners…<u>may be</u> most affected by increases in fine sediment…"
> "Fine sediments <u>can</u> seasonally collect in pools…"
> "Such sedimentation <u>can</u> reduce summer and winter rearing capacities…"
> "All salmonid species <u>would be</u> affected to some extent by such sedimentation if…"

102 "…floods and debris torrents may extensively redistribute sediment…"
"Forest practices can influence delivery and distribution of coarse sediment in streams…"
"Forest practices may reduce hillslope stability…"
"…excessive coarse sediment inputs can reduce the fish production capacity of a stream…"
"Dry reaches can occur where summer low flows are inadequate…"
"[Burial of] channel obstructions…will reduce the hydraulic value of the obstructions."
"Fish production in streams subject to debris torrents and dam-break floods can vary widely…"

103 Notably absent from the discussion of fine and coarse sediment is any description of current habitat conditions in the upper Green River basin, or any consideration of how they differ from properly functioning conditions described by NMFS (1996), or any other measure of habitat quality. The same is true for the discussion of peak flows and large woody debris in **DEIS Section 3.8.2.2.**

Environmental Consequences

104 The description of Upper Watershed Alternative B in **DEIS Section 4.3.2.2** posits that "[t]he increased level of protection provided under [Alternative B] is expected to reduce the rate of mass wasting as compared to historic conditions, and, over time, will allow the sediment transport regime and adequate habitats to return to a condition that more closely resembles unmanaged systems." The DEIS incorrectly presumes that the proposed HCP provides an "increased level of protection" toward reduction of surface erosion and landslides associated with logging or logging roads, and it provides no discussion or analysis to support the expectation insofar as it relates to those sediment sources.

105 There are no watershed analysis prescriptions for non-federal lands in the upper Green River basin that prohibit logging or road construction on potentially unstable slopes.

106 As mapped form aerial survey projects spanning the period 1958 to 1992, landslides that initiated at logging roads and logged slopes caused more than 16 miles of landslide runout through streams in the Lester WAU alone (Reynolds, 1996), where logging was generally less extensive than other WAUs in the upper Green River basin during that period of time. Montgomery and others (1998) suggest that road engineering cannot be relied upon to mitigate hazards entailed by siting logging roads on potentially unstable slopes. Based on their analysis of shallow landslides in 14 watershed in Washington and Oregon, they state:

106 The similar relationship between slide frequency and Qc [critical steady-state rainfall necessary to trigger slope instability] for road-related and in-unit slides indicates that the acceleration of landsliding owing to road construction appears to reflect where they are built as much as how they are built. Although the style of road construction can profoundly influence landslide hazards (e.g. Furniss *et al.*, 1991), siting of roads across, or the delivery of road drainage to, potentially unstable ground also has a primary influence on landslide frequency.

Their findings indicate watershed analysis prescriptions will not provide an increased level of protection toward reduction of landslides associated with logging or logging roads if such actions occur on potentially unstable slopes as allowed under prescriptions for the upper Green River basin.

107 Furthermore, regulatory oversight of watershed analysis prescriptions by the Washington Department of Natural Resources (WDNR) does not ensure prescriptions are implemented once "drafted," or finalized subsequent to SEPA review. This point is illustrated by the attached (1) permit for FPA 240555, (2) associated Informal Conference Note, and (3) letter from the Muckleshoot Indian Tribe Fisheries Department dated 23 December 1998. In this case, the permit issued by WDNR authorized logging and road construction in a portion of the Lester WAU classified as MWMU-11. Although final prescriptions for the Lester WAU have been in effect since March 1998, the Informal Conference note for FPA 240555 states that "no cut buffers were changed to comply with new draft prescriptions (dated 1-20-99)." The prescriptions for logging in areas mapped as MWMU 11 in the Lester WAU state that "no harvest is allowed in headwall areas, as identified on-the-ground, within MWMUs 11 and 11A." The permit issued by WDNR nevertheless authorizes clearcut logging in a mapped headwall area where channel heads are present, and where conditions on the ground where not reviewed by a geologist.

108 The proposed HCP clearly does not afford an increased level of protection in cases where proposed conservation measures are already required, such as limiting sediment delivery from surface erosion along roads to 50 percent of the calculated "background" surface erosion rates for sub-basins within the Lester WAU. In fact, in an area such as the Lower Mainstem sub-basin of the Lester WAU, where Cobo (1996) calculated the mainline road segment already contributes 72 "T/yr" of fine sediment to salmon-bearing streams (accounting for more than 85 percent of the fine sediment delivered to streams by roads in the sub-basin), Tacoma Water could increase sediment delivery from surface erosion along roads by an additional 13 "T/yr" and still comply with the HCP.

109 The proposed HCP measures for logging on unstable slopes (HCM 3-01N), watershed analysis (HCM 3-03A), road maintenance (HCM 3-03B), and road construction on unstable slopes (HCM 3-03C) include no binding criteria for reducing sediment delivery from logging and logging roads apart from requirements to complete or participate in planning efforts for which required reductions in sediment delivery from landslides are

nil, and required reductions in sediment delivery from surface erosion along logging roads need not surpass a threshold that sustains the annual yield at a level equal to 50 percent of calculated "background" level of surface erosion in a sub-basin. The DEIS provides no discussion of the environmental consequences of these measures apart from
109 claims that turbidity will be reduced. Such claims are without merit in the absence binding criteria for reducing sediment delivery from landslides, and quite ridiculous in reference to a plan that would permit surface erosion from logging roads to augment the "background" level of surface erosion in a sub-basin by 50 percent. Indeed, the actions permitted under such plan elements will perpetuate cumulative impacts to fish habitat and water quality in the Green River basin rather than "return geomorphic process to conditions that more closely approximate natural levels."

With regard to surface water quality and quantity in the upper Green River basin, the discussion of impacts from forest roads in **DEIS Section 4.3.4** principally provides a litany of sweeping generalities, such as the following statements (emphasis added), which could be said for any basin in western Washington:

110
> "…material inputs <u>may increase</u> turbidity and suspended solid levels in streams…"
> "Sediment delivery due to [road-related landslides] <u>is influenced by</u> road location…"
> "…delivery <u>would be greatest if</u> a road crosses a potentially unstable slope near a stream…"
> "… drainage extension <u>may occur when</u> [a road] intercepts surface or subsurface flow…"
> "[Increases in the rate of runoff] <u>may cause</u> larger peak flows in streams…"

With regard to the portions of the discussion of impacts to surface water quality and quantity that are specific to the upper Green River basin, **DEIS Sections 4.3.2.1 and 4.3.2.2** principally provide a restatement of some of the measures proposed in the HCP. The only exception in **DEIS Section 4.3.4.1** is the statement that "[r]educing road-related
111 sediment inputs to streams to less than 50 percent of background is expected to decrease the amount of sediment stored in pools and substrate interstices in upper watershed channels." The same "discussion" of environmental consequences would suffice for a plan that proposed removing a bucket of sand. In either case it fails to describe any impact to water quality or quantity in the upper Green River basin. The discussion in **DEIS Section 4.3.4.2** is somewhat more comprehensive, for it contains three exceptions: (1) "Alternative B would: 1) reduce the amount of sediment delivered to streams, and 2) reduce variability in stream flow and water quality…," (2) "[Alternative B] would reduce
112 sediment and dissolved solid delivery to streams resulting from road runoff or bridge or culvert failure," and (3) "[s]uch measures would enhance water quality by reducing turbidity and total dissolved solid levels in streams." However, these statements are not further supported by any discussion or analysis, and thus are merely claims providing no

112 insight into the environmental consequences of the proposed HCP, which as noted above includes no binding requirements for reducing sediment delivery from logging and logging roads.

113 With regard to discussion of the effects of erosion and sedimentation on fish habitat under the proposed HCP, **DEIS Section 4.3.6.2** merely provides a restatement of some of the conservation measures proposed in the HCP.

114 With regard to discussion of the effects of the proposed HCP on salmon, steelhead, and coastal cutthroat trout in the upper Green River basin, **DEIS Section 4.3.6.2** fails to discuss or even mention the environmental consequences of surface erosion or landslide runout from logging roads.

115 Finally, the DEIS fails to consider the potential reduction in purported benefits of the proposed HCP resulting from cost-share agreements for road management. The attached (1) permit for FPA 2405693, (2) letter from the Muckleshoot Indian Tribe Fisheries Department dated 24 February 1999, and (3) letter from WDNR dated 15 March 1999, indicate that road work can be authorized on Tacoma Water lands without Tacoma Water involvement in the permit application.

References

Coho, C., 1996, Surface erosion module, *in* Plum Creek Timber Company, L.P., ed., Lester Watershed Analysis: Plum Creek Timber Company L.P., Seattle, Washington, p. 4B-i to 4B-25, and appendix.

Krogstad, F., and Reynolds, P., 1997, Draft landslide hazard assessment for the Upper Green and Sunday Creek watershed administrative units, Green River basin, King County, Washington: report submitted to Washington Department of Natural Resources June 1997, 5 p., 2 maps at 1:24,000-scale, tables, and attachments.

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Reynolds, P., and Paulson, K., 1999, Draft landslide hazard assessment, Howard Hanson and Smay Creek watershed administrative units, Green River basin, King County, Washington: report prepared for Muckleshoot Indian Tribe Fisheries Department, Auburn, Washington, 34 p., 2 maps at 1:24,000-scale, 14 tables, 9 figures, 2 forms, and causal mechanism reports.

116

Attachment A: documents supporting the Comments on DEIS Discussion of Sediment Sources:

(1) Permit For FPA 2405693, and
Letter From MIT dated 24 February 1999,
Letter From WDNR dated 15 March 1999 ;

(2) Permit for FPA 2405555, and
Letter From MIT dated 23 December 1998

(3) Table: area of selected landslide features

4.3 TRIBAL COMMENT LETTERS

Comment Responses to Northwest Indian Fisheries Commission (TRI 1)

TRI 1-1 and TRI 1-2

Section 15.8 of the IA states in part that:

> "…nothing in this agreement is intended to limit or diminish the legal obligations and responsibilities of the Services as agencies of the federal government. Nothing in this agreement will limit the right or obligation of any federal agency to engage in consultation required under Section 7 of the ESA or other federal law."

The Services believe this fulfills the concern expressed by the commenter.

TRI 1-3 through TRI 1-9

This comment, titled "The HCP Does Not Address all of the Uses Authorized by the HCP," begins with the two following quotes from the HCP handbook:

> "HCP applicants should be encouraged to consider as large and comprehensive a plan area as is feasible and consistent with their land and natural resource use authorities."

> "Generally, applicants should be encouraged to include as comprehensive a set of activities in the HCP as is practicable."

These two quotes are used as a starting place to develop an argument by the commenter that is concluded with the following statement:

> "Mandatory elements of an HCP include information identifying the impacts that are likely to result from the proposed activities for which coverage is requested. This HCP is inadequate because it limits both the plan area and the activities authorized by the HCP to only a portion of the overall project. It fails to address the impacts of the regional water system that is created and the growth that is authorized as a result of the HCP. It is as if a developer submitted a plan to subdivide and develop a large

> parcel and the HCP only addressed take that would result from constructing the roads in the subdivision and did not address other impacts, such as septic systems."

The Services agree with the material quoted from the HCP Handbook, but believe the use of this material must be considered in the fuller context of the discussion from which it was taken. Following is an expanded quote from the HCP Handbook that should provide this context (text in italics was omitted by the commenter):

> "*For regional HCPs, the size of and configuration of the plan area will depend on various factors. Sometimes a regional HCP boundary will simply be a county line because a county government is the applicant. In other cases, it will be drawn to deliberately include or exclude certain activities, depending on the participants' objectives [see Section B.2(c) below]*. . .HCP applicants should be encouraged to consider as large and comprehensive a plan area as is feasible and consistent with their land and natural resource use authorities. . .*For regional and other large-scale planning efforts, the applicants will need to determine what activities they wish to include in the HCP and, if necessary, which ones they wish to exclude.* Generally, applicants should be encouraged to include as comprehensive a set of activities in the HCP as is practicable. . .*What is being authorized in a Section 10 permit is incidental take, not the activities that result in take.*"

We would also like to point out that the first sentence of the conclusory paragraph of the comment, which relates to the mandatory elements of an HCP, is nearly a quote from handbook. But it is worded in a way that could be misinterpreted. The sentence in the handbook correctly quoted states that, "A conservation plan submitted in support of an incidental take permit application must detail the following information. . . *Impacts likely to result from the proposed taking of the species* for which permit coverage is requested" (text in italics was misquoted by the commenter).

Considering the fuller context of the material quoted from the Handbook, and the correct recital of Mandatory Element Number 1, also from the Handbook, the Services respectfully disagree with the main premise of this comment, specifically that "This HCP is inadequate because it limits both the plan area and the activities authorized by the HCP to only a portion of the overall project. . .It fails to address the impacts of the regional water system that is created and the growth that is authorized as a result of the HCP."

The plan cannot in fact be inadequate for these reasons because the Services cannot force an Applicant to include or exclude area or activities for coverage, which is the Applicant's decision. Tacoma Water is only seeking incidental take coverage for water withdrawal and watershed management, not for regional growth. Furthermore, as the Handbook states, "what is being authorized in a Section 10 permit is incidental take, not the activities that result in take" (emphasis added).

Also refer to General Comment Response 29 regarding the relationship between the Tacoma Water HCP and regional growth.

TRI 1-10, 1-13, and 1-14

This comment, titled "The HCP and EIS fails to quantify the amount of take that is being authorized," concludes with the following paragraph:

> "Since Tacoma and other utilities participating in the regional water supply system are public entities involved in providing public services, they are as responsible as other governmental entities in ensuring that their activities do not promote take by their customers. Therefore the HCP needs to set forth a strategy for minimizing and mitigating the uses of the Tacoma Water withdrawals authorized by the HCP."

As in the previous comment response, the Services must point out that as the HCP Handbook states, "what is being authorized in a Section 10 permit is incidental take, not the activities that result in take." The previous comment response also points out that the HCP Handbook states that the geographic scope and list of activities proposed for ITP/HCP coverage are determined by the Applicant, not the Services. Tacoma Water's proposal does not include a request for coverage of urban growth in its service area, or for the ultimate use of the water it withdraws and distributes.

Furthermore, the Services are of the opinion that Tacoma Water cannot be held accountable for growth and development planning decisions made under the authorities of the Growth Management Act.

The Washington State Growth Management Act of 1990 is administered by the Department of Community, Trade, and Economic Development. Disputes regarding growth management plans and

decisions are handled by regional growth management hearings boards. Pierce and King Counties are located within the jurisdiction of the Central Puget Sound Growth Management Hearings Board.

Refer to General Comment Response 28 for additional information.

TRI 1-11

Refer to General Comment Response 4.

TRI 1-12

The commenter is correct that most of the incidental take of existing salmonids would occur in the middle reaches of the Green River. Tacoma Water's HCP is designed to avoid, minimize, and mitigate impacts to salmonid populations in those reaches. In addition, the upstream fish passage facility (HCM 1-03), Headworks downstream fish passage facility (HCM 1-04), the Howard Hanson Dam downstream fish passage facility (HCM 2-01), and the transport and release of juvenile salmonids into the upper watershed (HCM 2-05) are measures designed to support restoration of anadromous fish production to the Upper Green River Watershed.

The NMFS designated the Upper Green River Watershed above Howard Hanson Dam as critical habitat for Puget Sound chinook salmon effective 17 March 2000 (50 CFR 226). Several of the watershed management conservation measures (HCM 2-03, 2-04, 2-10, HCM 3-01, HCM 3-02 and HCM 3-03) are designed to protect and restore habitat conditions in the upper watershed. During 1998, the USACE estimated that available habitat in the upper watershed could support an escapement of up to 2,300 adult chinook salmon (U.S. Army Corps of Engineers 1998, Appendix F, Section 8D, Table 4). Adult chinook salmon currently do not have access to the upper watershed, and providing access to this underutilized habitat is an important aspect of the HCP (see HCM 1-05 and HCM 2-05).

TRI 1-15

The amount of take of Covered Species expected to result under the ITP will be determined and documented in two separate Biological Opinions, one issued by NMFS for covered salmon species, and one issued by the USFWS for all other Covered Species. Producing a Biological Opinion is required under Section 7(a)(2) of the ESA, and the ESA implementing regulations contained in 50 CFR Part 402. The part of the Biological Opinion that documents anticipated take is known as the Incidental Take Statement.

When determining the amount of incidental take, the Services must first determine how incidental take will be calculated. The method of calculation depends on the ability to determine the number of individuals of each Covered Species occupying the Covered Lands and/or the number of acres of habitat to be affected. Depending on this information, proposed incidental take levels can be expressed in one of two ways: 1) in terms of the number of animals to be, "killed, harmed, or harassed," if those numbers are known or can be determined; or 2) in terms of the acres of habitat or other appropriate habitat units to be affected generally or because of a specific activity, in cases where the specific number of individuals is unknown or indeterminable. The latter is typically expressed as all individual animals occupying a given amount of habitat, in whatever habitat unit is being used.

Incidental take under the Tacoma Water HCP will be expressed in terms of habitat. The incidental take of Covered Fish Species will be determined by projecting changes in potential habitat, which will be defined as the weighted usable area, acres of surface area, and changes in channel width containing habitat conditions used by various life stages of fish. The incidental take of Covered Wildlife Species will be determined as the total estimated area of habitat for each Covered Species that will be eliminated or adversely modified over the term of the HCP.

TRI 1-16

See Specific Comment Response TRI 1-15. Baseline habitat conditions and overviews of baseline populations of Covered Fish Species are described in HCP subsection 4.5, HCP Appendix A, DEIS subsection 3.8 and DEIS Appendix B. Baseline habitat conditions for Covered Wildlife Species are described in HCP subsections 4.4.2 and 4.4.3, HCP Appendix A, and DEIS subsection 3.9.

TRI 1-17

See Specific Comment Response TRI 1-15. The conservation needs of listed fish species are discussed in HCP subsection 4.5.

TRI 1-18

See Specific Comment Response TRI 1-15. The effects of the ITP and HCP are described in HCP subsections 7.1 through 7.10, DEIS subsection 4.2.6, DEIS subsection 4.3.6, and DEIS Appendix B. In particular, DEIS Appendix B provides detailed projections of changes in fish habitat and fish survival under each of the HCP alternatives.

TRI 1-19

See Specific Comment Responses TRI 1-15 through TRI 1-18. The Services will use the quantitative and qualitative information identified in the earlier comment responses when preparing the required biological opinions for the Tacoma Water ITP. The ITP will not be issued until the Services determine, through review of the information, that the issuance criteria of Section 10(a)(2)(B) are met.

TRI 1-20

See General Comment Responses 29 and 30.

TRI 1-21

See General Comment Response 29.

TRI 1-22

See General Comment Response 29.

TRI 1-23

Data noted.

Comment Responses to Muckleshoot Indian Tribe (TRI 2)

TRI 2-1

Comment noted. The Services acknowledge the 1995 Agreement between the Muckleshoot Indian Tribe and the City of Tacoma, and recognize its influence on Tacoma Water's HCP.

TRI 2-2

The Services do not believe that the review of Tacoma Water's HCP is premature. We recognize and concur with the commenter that this Section 10 HCP effort and the Section 7 consultation of the USACE's Additional Water Storage Project are interrelated. The triggers for review under the ESA for the two projects are different, and neither is directly controlled by the Services. The USACE is required to initiate consultation with the Services when it believes its existing activities may affect newly listed species, or its proposed activities may affect previously listed species. The USACE is currently consulting with the Services regarding the effects on listed species of continued operations at Howard Hanson Dam and the proposed Additional Water Storage Project.

Conversely, Tacoma Water is not required to consult with the Services under Section 7 of the ESA. Tacoma has chosen to voluntarily develop an HCP under Section 10 of the ESA to address the effects of its water withdrawal and forestry activities on listed and unlisted species in the Green River Watershed.

As with other HCPs, the timeline for completion of, and the species to be addressed by, the HCP is controlled mostly by Tacoma Water, not the Services. Unlike the federal Section 7 process of the ESA, Tacoma Water can, under Section 10, address its effects on unlisted species as well as listed ones. Instead of preparing a Biological Assessment for the Services to review, as would the USACE, Tacoma Water submitted to the Services a final draft of its HCP for ESA review. We are currently reviewing Tacoma Water's HCP and public comments, and will write a Biological Opinion based on our analyses.

Based on discussions with both NMFS and USFWS Section 7 biologists and City representatives for the Tacoma Water HCP, we anticipate that an Incidental Take Statement would be issued to the USACE for its Green River operations before an ITP issuance decision is made regarding the Tacoma HCP. This timeline is subject to change based on new information, issuance criteria not

being met, a determination of non-concurrence, a jeopardy determination by one or both of the Services, or needed changes to the HCP or project features.

Even if an Incidental Take Statement is delayed, Tacoma Water can be issued a Section 10 ITP to cover those activities that are independent of USACE actions. For Tacoma Water activities related to USACE operations, ITP coverage would begin once the Incidental Take Statement has been issued to the USACE.

TRI 2-3

The action area of Tacoma Water's withdrawals extends from the Upper Green River Watershed down to the upstream extent of the tidal influence zone (approximately RM 11.0). Below RM 11.0, other human-caused factors such as diking, dredging, urbanization, and natural factors such as the daily rise and fall of the tide have an overriding influence on instream conditions compared to Tacoma's water withdrawals.

Indirect effects of the action may occur outside of the area directly affected by the action (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998). In its HCP, Tacoma analyzed the effects of its water withdrawals on water quality in the Green River below RM 11.0 in its analyses of species life stages (HCP subsections 7.1 through 7.10). The analyses found that the effects of Tacoma Water's withdrawals, including the benefits of the conservation measures, do not extend sufficiently far downstream to materially affect the lower Green River estuary.

TRI 2-4

See General Comment Response 13. Additional discussion on the merits of individual flow management measures is provided within responses to Muckleshoot Indian Tribe specific comments.

TRI 2-5

The commenter is correct in noting that interspecies/lifestage tradeoff decisions are complicated. The Howard Hanson Dam non-dedicated storage and flow management strategy (HCM 2-02), however, provides increased opportunity and flexibility to manage flows in the Green River and, thus, increased opportunity for protection and restoration of aquatic resources. The proposed monitoring plan would provide feedback on the effects of alternate flow management strategies and allow the Green River Flow Management Committee to adaptively manage flows to provide the greatest overall benefit to instream resources.

The commenter notes that a tentative flow management strategy was developed based on an analysis of 32 years of daily flow records, but adds that "… the use of hindsight is impossible during the refill season." The type of analysis used to evaluate alternate flow management strategies (CH2M Hill 1997) relied on in-season decision factors external to the hydrological record, such as the level of snowpack at Stampede Pass and volume of water stored in the reservoir at specific milestones, to guide decisions. The analysis identified the number of times management objectives were achieved by different flow strategies under the variety of hydrologic conditions that occurred during the 32-year period of record. This type of analysis provides information on how a flow management strategy would perform over a period of several years if future hydrological conditions were comparable to the 32-year period of record.

The commenter further noted that under the tentative flow management strategy identified in the Additional Water Storage Project, the proposed wet condition target baseflow (i.e., 900 cfs) would allow off-channel habitats to be disconnected from the mainstem during low flow periods. While a target baseflow of 900 cfs would not provide complete side channel protection, it would be an improvement compared to low spring flows experienced during past Howard Hanson Dam operations. In addition, the flexibility provided by HCM 2-02 allows target baseflows to be increased under the recommendations of the Green River Flow Management Committee. For instance, the springtime target baseflow could be increased if artificial freshets were not released. The specific benefits provided by HCM 2-02 give the Tribe and natural resource agencies greater responsibility for flow management decisions, and the monitoring measures described in HCP Chapter 6 provide feedback to guide future decisions.

TRI 2-6

See General Comment Response 26.

Tacoma Water has indicated to the Services that an open technical discussion of the potential use of water storage to support fish would be valuable. We believe that the Green River Flow Management Committee is an appropriate group to sponsor these discussions. This group would also be an appropriate forum to discuss how the region might respond to unforeseen fish protection needs under extraordinary circumstances such as a drought.

TRI 2-7

See General Comment Response 27 for a discussion of natural flow variation.

The IFIM is a tool used in determining instream flow requirements, and as such has inherent strengths and weaknesses. In response to comments received during the scoping phase of the Additional Water Storage Project, Tacoma Water and the USACE conducted additional studies of juvenile salmon migration, side channel connectivity and steelhead incubation in the Green River to supplement the IFIM study conducted by Ecology.

The IFIM remains the method generally used by the WDFW and Ecology (Washington Department of Ecology 1998), as well as the Services, to assess instream flow requirements. Ecology used the IFIM in its analyses of Green River instream flow requirements in 1989 and continue to use the method in 2000 to assess instream flow requirements in other river basins in Washington State.

TRI 2-8

Comment noted. The tentative target base flow levels identified in the Additional Water Storage Project and referenced in the HCP do not provide full protection of off-channel habitats. However, the flexibility in springtime flow management under HCM 2-01 (Howard Hanson Dam downstream fish passage facility) and HCM 2-02 (Howard Hanson Dam non-dedicated storage and flow management strategy) provides target base flows much higher than the minimum flow levels established by Ecology.

TRI 2-9

The Services agree that boulder placement should not be used as a surrogate for wood placement. The intent of the HCP habitat rehabilitation measures is to utilize the most appropriate enhancement technique for the channel type at any specific site. The text in HCM 2-03 has been revised to clarify this point (see FEIS, Volume II, Section 5.0).

To be successful, habitat rehabilitation techniques applied in any given channel must mimic channel processes and morphology (Hogan and Ward 1997). Channel morphology varies along the stream network. High gradient reaches tend to be dominated by coarse substrate, step-pool morphology, and turbulent flows; low gradient reaches have smaller, well-sorted substrate, laterally oscillating bedforms, and less turbulent flow (Montgomery and Buffington 1993). Placement of boulders to improve fish habitat is most appropriate in steep channels with high water velocities (Hogan et al.

1997; Rosgen and Fittante 1986; Seehorn 1985). Boulders can also be used to improve habitat in low gradient reaches of large rivers, particularly in combination with large woody debris (Slaney et al. 1997).

Most of the aquatic habitat rehabilitation projects proposed in the HCP would be implemented in the mainstem Green River. Upstream of Howard Hanson Dam, the mainstem Green River has an average bankfull width of 100 to 200 feet and a gradient of 1 to 2 percent. As a result, only the largest pieces of wood are expected to remain stable; the estimated minimum size of a "key piece" in a river this size is more than 24 inches in diameter and up to 100 feet long (Schuett-Hames et al. 1999). Although placement of large woody debris represents the primary rehabilitation strategy to be applied under Tacoma's HCP, it is anticipated that boulders would be used to help stabilize individual pieces of large woody debris or log jams. In addition, boulders may represent the most appropriate rehabilitation strategy at certain sites based on channel morphology and geomorphic processes.

Final designs for site-specific habitat rehabilitation projects are currently being developed as part of the Additional Water Storage Project. The Services will review all site-specific designs to ensure proposed rehabilitation techniques are appropriate for the particular channel type.

TRI 2-10

See General Comment Responses 25 and 26.

TRI 2-11

See General Comment Response 15.

The proposed Second Supply Agreement between Tacoma and its partner utilities provides for the use and sharing of Tacoma's Second Diversion Water Right. Water available under this Second Diversion Water Right is determined based on stream flows for a given year and is subject to the requirements of the state-issued water right and such other restrictions on the use of the Second Diversion Water Right, which Tacoma has agreed to with other parties. Both the state limitations on the water right and the agreements with other parties such as the Muckleshoot Indian Tribe have been incorporated into the HCP. Therefore, only water that is available after meeting the requirements of the HCP are available to Tacoma's project partners under the proposed Second Supply Project.

TRI 2-12

Potential flow management options for the Green River are appropriately developed by the Green River Flow Management Committee. Tacoma has provided a flow scenario in its HCP that was developed in coordination with the Muckleshoot Indian Tribe and resource agencies. However, there are clearly differences of opinion among resource agencies as to the best use of stored water to protect aquatic resources. This issue will be refined with the continued input of resource managers and interested parties.

TRI 2-13

See General Comment Response 30.

TRI 2-14

See General Comment Responses 12 and 13 regarding the Services' ESA consultation with the USACE. This consultation will address the effects of the Additional Water Storage Project on listed species, and per Secretarial Order, we anticipate consulting with the Muckleshoot Indian Tribe prior to issuance of an ESA Section 7 Incidental Take Statement.

The potential success or failure of Tacoma Water's proposed conservation measures will be an important consideration when the Services deliberate issuance of an ESA Section 10 ITP.

TRI 2-15

Comment noted.

TRI 2-16

The commenter is correct. While formal, approved prescriptions exist only for the Lester Watershed Administrative Unit, draft prescriptions have been developed for the Upper Green, Sunday, Howard Hanson, and Smay Watershed Administrative Units. Tacoma's practice has been to implement draft Watershed Analysis prescriptions as they are developed. This practice would become a formal commitment under the HCP (HCM 3-03A).

TRI 2-17

As described in HCP subsection 2.3.3.2, the HCP does not cover Phase II Additional Water Storage Project activities.

TRI 2-18

See Specific Comment Response TRI 2-9.

TRI 2-19

We acknowledge that use of the terminology "water flow improvements" on page 2-15, line 24 (not line 14) is an oversimplification. A more appropriate terminology would have been "increased opportunity and flexibility to manage Green River flows for the overall benefit of aquatic resources."

TRI 2-20

All new culverts placed under the HCP would be designed and constructed to pass the 100-year flood plus associated debris. In addition, it is anticipated that fish passage barriers, existing undersized culverts, or culverts in Mass Wasting Map Units prone to debris flows would be identified and prioritized for treatment within 2 years following issuance of the ITP under the Road Sediment Reduction Plan. Culverts that are designed to pass a 50-year flow, functioning properly, in good condition, and that do not have a history of blockage problems would not be replaced to pass a 100-year flow until the culvert shows signs of wear and needs replacement. We believe this approach is proactive and would minimize the risk of fire-related culvert failures.

TRI 2-21

A. The HCP does not allow salvage logging to occur in the CMZ. As noted in HCM 3-01F, "No salvage harvesting will occur within no-harvest portions of riparian or wetland buffers." As further defined in Table 5-2 (footnote 2), the No-Harvest Buffer Width " . . . will be measured horizontally from the ordinary high water mark, Channel Migration Zone, or channel disturbance zone, <u>whichever is greater</u>…." Consequently, these HCP measures are consistent with the requested modifications, and no change to the HCP is required.

B. Under HCM 3-01F, no tree, nor portion of a tree, that has entered the stream channel would be salvaged. This HCM has been revised to reflect this clarification (FEIS Volume II, Section 5.0).

TRI 2-22

Comment noted. Comments regarding Watershed Analysis and mass wasting are addressed in the response to the Muckleshoot Indian Tribe specific comments on sediment sources.

TRI 2-23

Comment noted.

TRI 2-24

Chapter 4 of the HCP provides a description of existing conditions and the currently regulatory status of the Green River basin, and is not intended to support or justify the adequacy of conservation measures to be implemented under the HCP. Analyses of the anticipated effects of the HCP are contained in HCP Chapter 7.

TRI 2-25

Comment and data noted. The USACE has recently initiated Section 7 consultation with the Services regarding Howard Hanson Dam operations; the effect of Howard Hanson Dam operations on sediment transport in the Green River is a subject of the consultation. The Services would appreciate that these, and other relevant data on fine sediment transport, be forwarded to the USACE for use in Section 7 consultations.

TRI 2-26

Section 303(d) of the federal Clean Water Act requires states to identify and list threatened and impaired water bodies. The Washington State Department of Ecology is responsible for identifying and recommending waterbodies in Washington State for inclusion in the 303(d) list.

TRI 2-27

See Specific Comment Response TRI 2-25.

TRI 2-28

Both the Watershed Analysis conducted by the Mt. Baker-Snoqualmie National Forest (U.S. Forest Service 1996) and a recent draft analysis of the Upper Green and Sunday Creek Watershed Administrative Units (Plum Creek Timber Company 1997) indicate that landslides during the mid-1970s produced the greatest volume of sediment, despite the fact that the highest peak streamflows occurred in the 1990s. The historically high landslide and sediment delivery rate was tentatively attributed to outdated road construction and maintenance practices (U.S. Forest Service 1996).

TRI 2-29

As described in HCP Chapter 7, HCP impact analyses assumed Howard Hanson Dam was operating, and did not rely on the estimated natural flow data to quantitatively assess impacts. The HCP analyses compared conditions under the proposed HCP to conditions without Tacoma Water withdrawals but with Howard Hanson Dam. Three specific flow conditions were used in the analyses using estimated daily flows of the Green River at Auburn from the period of record 1964 to 1995. The impacts analysis procedure compared:

- Green River flows with the Additional Water Storage Project and with Tacoma Water withdrawals;

- Green River flows without the Additional Water Storage Project and without Tacoma Water withdrawals; and

- Green River flow conditions without the Additional Water Storage Project and with Tacoma Water withdrawals.

Comparisons of these three flow conditions allowed investigators to isolate and quantify the effects of Tacoma Water withdrawals. In addition to the quantitative analyses, comparisons of estimated natural flow conditions (that is, without Howard Hanson Dam) were used as a qualitative check.

As noted in HCP subsection 4.1.4.1, the hydrological model used to develop the flow regimes (CH2M Hill 1997) did not incorporate information on potential variations in flow due to long-term changes in climatic conditions, regulatory-driven changes in forest harvest activities in the upper watershed, or other changes in land use activities over the last 40 years. Incorporating estimates of these factors would slightly alter results of the hydrologic model predictions. However, since all simulated flow conditions were generated from the same data set, these modifications would not affect the results of the HCP impact analyses.

In the DEIS, all alternative baseline conditions assumed both Howard Hanson Dam and the First Diversion Water Right claim were functioning.

TRI 2-30

The commenter correctly notes that portions of the mainline haul roads located north and south of the mainstem Green River above Howard Hanson Dam also artificially constrain the channel, thus reducing floodplain connectivity.

TRI 2-31

Artificial channel constraints or changes in the flow and sediment regime that reduce channel migration do result in long-term reductions of both large woody debris and gravel recruitment. The commenter cited HCP subsection 4.2, which is limited to a description of the structural setting. The combined effects of both structural and operational impacts on natural geomorphic processes are discussed in detail in HCP subsection 4.5.3, Current Processes Affecting Fish Habitat and Populations.

TRI 2-32

There are no records of the total number and size of logs removed annually from the reservoir. As noted in HCP subsection 5.2.8, Downstream Woody Debris Management Program, approximately 2 to 7 acres (about 100 to 150 tons) of woody debris are collected annually. The actual amount collected varies widely since woody debris input and transport are episodic. This estimate represents the best current enumeration of the volume of wood entering the Howard Hanson Reservoir and collected on an annual basis. An annual estimate of the number of pieces of large woody debris would be initiated as part of Tacoma Water's proposed monitoring measures.

TRI 2-33

See General Comment Response 19.

TRI 2-34

Habitat Conservation Plan subsection 4.4.1 notes that the lower Green River watershed is used "extensively" by juvenile salmonids; this was not meant to infer that this reach is used 'exclusively' by juvenile salmonids as the commenter implies. An analysis of the effects of Tacoma Water withdrawals on chinook salmon spawning in the lower watershed is contained in HCP subsection 7.1.3.3.

TRI 2-35

The analysis of the effects of Tacoma Water withdrawals on chinook salmon spawning assumed spawning occurred from 1 September through 30 November (see HCP subsection 7.1, Effects of Water Withdrawal and Habitat Conservation Measures on Chinook Salmon).

TRI 2-36

Comment noted.

TRI 2-37

When the White River was diverted to the Puyallup River in the early 1900s, it reduced flow in the Green River downstream of approximately RM 34.5. As defined in the HCP, the lower Green River included only the reach downstream of RM 33.8. Thus, the diversion of the White River affected flows throughout the lower Green River. The discussion of the past diversion of the White and Black Rivers from the lower Green River was presented in HCP subsection 4.5.2.1 as general background information. Detailed discussion of the effects of each of these past actions on specific salmon species is beyond the scope of Tacoma Water's HCP.

TRI 2-38

Comment noted.

TRI 2-39

The Services agree that clarification would be helpful. The earliest available flow data for the Green River consist of a single year of data collected near Palmer in 1911. Tacoma's water withdrawals commenced in 1913, but a consistent flow record was not established until 1936, when the USGS installed a gauge at Auburn. Based on the flow record from 1936 to construction of Howard Hanson Dam in 1962, summer flows increased following construction of Howard Hanson Dam. However, a simulation of "natural" flows (i.e., in the absence of Howard Hanson Dam and Tacoma's withdrawal) suggests that summer low flow augmentation by Howard Hanson Dam did not completely offset Tacoma's water withdrawals (WRIA 9 Factors of Decline Subcommittee and Washington Conservation Commission 2000). The simulation is based on flow records from 1964 through 1996, thus the influences of climatic changes and the effects of land use on the simulated "natural" flow regime were not assessed.

TRI 2-40

Comment noted.

TRI 2-41

Potential increases in peak flows resulting from recent timber harvest were calculated for the Lester and Upper Green/Sunday Watershed Analyses (Plum Creek Timber Company 1996). Maximum estimated increases in the 2-year return interval event for the various subbasins ranged from 5 to 9 percent. In a federal Watershed Analysis conducted by the Mt. Baker Snoqualmie National Forest, the current extent of "disturbed vegetation" in the upper Green River subbasin was estimated to be 20 percent; increased vegetation disturbance is assumed to correlate with increased peak flows (U.S. Forest Service 1996). The Mt. Baker Snoqualmie National Forest considers 12 percent disturbed vegetation to be the threshold of concern for hydrologic effects (U.S. Forest Service 1996).

TRI 2-42

See Specific Comment Response IND 1-8.

TRI 2-43

See General Comment Response 27 for a discussion of natural flow variation.

The IFIM is a tool used in determining instream flow requirements, and as such, has inherent strengths and weaknesses. In response to comments received during the scoping phase of the Additional Water Storage Project, Tacoma Water and the USACE conducted additional studies of juvenile salmon migration, side channel connectivity, and steelhead incubation in the Green River to supplement the IFIM study conducted by Ecology.

The IFIM remains the method generally used by Ecology and the WDFW (Washington Department of Ecology 1998), as well as the Services, to assess instream flow requirements. Ecology used the IFIM in its analyses of Green River instream flow requirements in 1989 and continues to use the method in 2000 to assess instream flow requirements in other river basins in Washington State.

TRI 2-44

Providing anadromous fish passage to the Upper Green River Watershed would restore access to approximately 66 miles of potential salmon habitat and steelhead habitat (U.S. Army Corps of Engineers 1998). We agree that much of the habitat upstream of Howard Hanson Dam has been

degraded by past timber harvest and road construction. The impacts from past timber harvest and road building (e.g., sedimentation, scarcity of large woody debris, elevated water temperatures) will continue to affect habitat recovery for years into the future. However, landowner HCPs and federal recovery efforts will ensure that the upper watershed stream corridors will receive greater protection than under past regulations and harvest practices.

Because of these commitments, the Services are optimistic that, over the long term, the increasing emphasis on habitat protection and restoration will improve habitat conditions in the upper watershed.

TRI 2-45

See Specific Comment Response TRI 2-9.

TRI 2-46

See Specific Comment Response TRI 2-5.

TRI 2-47

See Specific Comment Response TRI 2-9.

TRI 2-48

It is impossible to quantify an unusually large event in terms of large woody debris inputs because of the stochastic nature of wood recruitment. A catastrophic landslide that delivered a large amount of large woody debris could occur during a moderate precipitation or flow event if antecedent conditions had resulted in increased instability. Conversely, a 100-year return interval flow event could result in little wood recruitment if potentially unstable landforms or banks had recently failed in a prior event, or did not support vegetation of a sufficient size to qualify as large woody debris at the time of failure. Reductions in the proportion of wood placed can occur only with the express written approval of the Services, thus the declaration of any annual wood collection volume as "unusually large" must be mutually acceptable and is not at the sole discretion of Tacoma Water.

TRI 2-49

The Services believe that large woody debris distributed naturally by river flows would provide better habitat conditions for fish in the lower and middle Green River than anchored wood. Prior to implementing the program, the Services and Tacoma would work with interested parties to address

boater safety concerns associated with the proposed Woody Debris Management Program. If, due to boater safety concerns, wood is not transported below Tacoma's Headworks and allowed to naturally distribute downstream, Tacoma Water has committed to providing equivalent funds to be spent on anchored placement of large woody debris in Green River mainstem and off-channel habitats. Tacoma Water has agreed to establish a funding bank for anchored large woody debris placement above and beyond the cost of unanchored placement in the event that such an approach became necessary. This contingency is clearly identified in HCM 2-08. In addition, if the Services determine that large woody debris accumulations have become problematic, Tacoma Water would be required to reallocate the funds to other habitat restoration efforts.

Under the terms of the HCP, wood that cannot be used to fulfill the requirements of the downstream woody debris management program or other conservation measures to be implemented under Tacoma Water's HCP would be made available for other habitat restoration projects, with projects proposed in the Green River basin to be given a higher priority. The Services believe these commitments are sufficient to ensure that wood that is not placed in the river unanchored because of permitting or safety issues would be used in a manner that contributes to the overall habitat restoration goals for the Green River basin.

TRI 2-50

Habitat Conservation Measure 2-09 has been edited to clarify that the amount of gravel placed as a result of the program funded jointly by Tacoma Water and the USACE (i.e., 3,900 cubic yards/year) cannot be reduced without the express approval of the Services. Potential alternative mitigation measures, including adjustment of the location or method of placement, are identified in HCM 2-09. If permitting or safety issues preclude the placement of gravel, the funds earmarked for gravel placement would be reallocated to other habitat restoration measures. Reallocating funds to other habitat restoration efforts would contribute to overall habitat protection in the Green River basin and represents a reasonable contingency.

TRI 2-51

Sediment transport analyses suggest that the effects of interrupted gravel transport have already impacted the reach between the Headworks Dam and Kanasket State Park, and are beginning to affect the river in the vicinity of Flaming Geyser (Perkins 2000). Degradation of the 15 miles of habitat below Flaming Geyser would impact the highest density of salmon spawning in the Green River. We are also aware that many chinook salmon spawn upstream of the Green River gorge.

Thus, placement of gravel between the Headworks and the Green River gorge is identified as an alternative under Tacoma Water's HCP.

In the Additional Water Storage Project Draft Feasibility Study, Appendix F, Section 4B, approximately 11,800 cubic yards of gravel could be placed in the Green River annually to benefit the sediment transport regime. Team members from several Green River restoration projects met on 26 October 1999 to discuss gravel restoration opportunities in the Green River. Participating representatives included the Green-Duwamish Ecosystem Restoration General Investigation Project, USACE Additional Water Storage Project, Tacoma Water Habitat Conservation Plan, and USACE Section 7 ESA consultation (HDR Engineering, Inc. 2000). The meeting participants tentatively agreed to divide the gravel nourishment opportunities as follows (Table TRI 2-51):

Table TRI 2-51. Gravel nourishment opportunities among King County, USACE, and Tacoma Water.

Entity	Project	Location	Quantity (cubic yards)	Duration
King County / USACE	Green-Duwamish Ecosystem Restoration, General Investigation	Palmer	4,000 [1]	Years 1 to 5
King County / USACE	Green-Duwamish Ecosystem Restoration, General Investigation	Flaming Geyser	4,000 [1]	Years 1 to 50
USACE / Tacoma Water	Additional Water Storage Project / HCP	Palmer	3,900 [2]	Years 1 to 50
USACE	ESA Section 7	Palmer	4,000 [1]	Years 6 to 50

[1]Volume to be adjusted through adaptive management by monitoring the rate of sediment aggradation.

[2]Volume subject to change as directed by the Services.

Provided that gravel placement at Flaming Geyser is implemented under the Green-Duwamish Ecosystem Restoration General Investigation Project, we agree that gravel nourishment under the HCP should be directed at the Palmer reach of the Green River. However, until gravel placement at Flaming Geyser is assured under the General Investigation Project, the HCP should continue to identify the Flaming Geyser reach as the preferred location for gravel nourishment. If monitoring and adaptive management indicate that additional or alternate locations are needed for gravel placement, the Services and Tacoma would work with Muckleshoot Indian Tribe, federal, state, and local agencies with jurisdiction (HCM 2-08) to select those locations.

TRI 2-52

See Specific Comment Response TRI 2-9.

TRI 2-53

The intent of HCM 3-01B is to allow for a broad definition of "danger tree" that can be applied on a case-specific basis in the field. Given potential severe implications of leaving a danger tree standing (i.e., possible human injury or death), it is considered best management practice to allow the individuals maintaining and using a given road to determine what is and is not a danger tree. The safety of all parties using the roads on the Covered Lands is of the utmost concern to Tacoma Water. Conversely, the risk to fish and wildlife resources of having a broad definition of danger tree is relatively low because of the small number of trees that could potentially be affected on a managed landscape such as the Covered Lands. If a danger tree were felled in the Natural Zone within 150 feet of a road, it would only be removed if needed elsewhere to meet one or more of the conservation measures of the HCP.

The area of potential danger tree removal extends 150 feet from the road to account for trees on steep slopes above roads that can slide onto road surfaces once they fall. Similar slope conditions likely occur along streams. The relative large woody debris contribution of trees on steep slopes and more than 100 feet from streams is relatively inconsequential if the area closer to the stream is actively managed for large woody debris recruitment (McDade et al. 1990). Nevertheless, as noted in HCP Table 5-2, the managed large woody debris recruitment zone is 200 feet wide on all fish-bearing streams. It is reduced to less than 150 feet only along non-fish-bearing streams where large woody debris recruitment is expected to be concentrated in the first 50 feet.

TRI 2-54

See Specific Comment Response TRI 2-21.

TRI 2-55

Comment noted. Comments regarding Watershed Analysis and mass wasting are addressed in the response to the Muckleshoot Indian Tribe specific comments on sediment sources.

TRI 2-56

Trees landward of roads and rights-of-way, but within the specified buffer width are <u>not</u> <u>excluded</u> from the no-harvest riparian buffer unless considered danger trees (see Specific Comment Response

TRI 2-53). If a tree falls across the road toward the stream, only that portion of the tree that interferes with normal road use or poses a danger to individuals using the road would be removed. Cut portions would be deposited in the streamward portion of the buffer zone. Tacoma Water may move and place the remainder of the tree into the stream if such activity is practicable and would not cause undue disturbance in the no-harvest zone or otherwise violate the terms of the HCP. Habitat Conservation Measure 3-02A has been modified to clarify management of buffers landward of roads and rights-of-way.

TRI 2-57

Comment noted. Comments regarding Watershed Analysis and mass wasting are addressed in the response to the Muckleshoot Indian Tribe specific comments on sediment sources.

TRI 2-58

As described in HCM 3-03J, new culverts would be designed to pass the 100-year flood. Although not explicitly stated in the HCP, culvert design and installation are required to conform with WAC 220-110-070 3(c): "Culverts shall be installed according to an approved design to maintain structural integrity to the 100-year peak flow with consideration of the debris loading likely to be encountered."

TRI 2-59

Tacoma Water would abandon roads on its land no longer needed for watershed management (e.g., water quality sampling, control of unauthorized access, access to water supply facilities), forestry operations, implementation of the HCP, or by other landowners to access their properties. Agreements with adjacent landowners are not necessary to abandon Tacoma Water's roads if the roads are not needed by adjacent landowners to access their properties.

TRI 2-60

The results of a study using IFIM are appropriate tools to assess instream flow requirements provided channel conditions have not "changed greatly" since measurements of the channel configuration and hydraulics were completed. We are unaware of any data that demonstrates that since Ecology collected the physical and hydraulic data used in its instream flow study, channel changes in the Green River are so great as to invalidate the results of Ecology's study. Criteria curves, which describe habitat characteristics of spawning chinook salmon, were developed from observations of spawning chinook salmon, including observations of chinook salmon spawning in

the Green River collected by biologists from Ecology. The criteria curves used by Ecology for the Green River instream flow study were reviewed by state and Muckleshoot Indian Tribe biologists and approved for use on the Green River during a meeting held on 7 March 1988 (Caldwell and Hirschey 1989).

TRI 2-61

Comment noted. Comments regarding Watershed Analysis and mass wasting are addressed in the response to the Muckleshoot Indian Tribe specific comments on sediment sources.

TRI 2-62

To consider the validity of the assertion, the referenced data must be provided with the comment. In particular, the comment references that measurements of the water depth at riffle crests <u>averaged</u> 0.73 feet (emphasis added). To pass a riffle crest, adult chinook salmon do not need the average depth of the entire stream channel to exceed 1 foot, but rather must have a 1-foot-deep slot within the channel to pass upstream.

TRI 2-63

The Lester Watershed Analysis Fish Habitat Module Assessment reported that fine sediment concentration ranged from 10 to 32 percent in nine samples collected in 1994 (Plum Creek Timber Company 1996).

TRI 2-64

The minimum depth of chinook salmon observed actively spawning in the Green River was recorded as 1 foot by biologists from Ecology (Caldwell and Hirschey 1989). During a 7 March 1988 meeting with biologists from Washington Departments of Ecology, Fisheries, and Wildlife, and Muckleshoot Indian Tribe, the optimum depth for chinook salmon spawning in the Green River was assumed to be greater than 1.2 feet. At a depth of 1 foot, spawning habitat suitability dropped to 75 percent of optimum and dropped to 0 percent of optimum at 0.5 foot. The minimum depth criterion of 1 foot for chinook salmon spawning provides a valid index of the effect of Tacoma Water withdrawals on chinook spawning and incubation.

TRI 2-65

Comment noted. Providing adult chinook salmon access to the Upper Green River Watershed would increase the availability of spawning habitat and extend the current range of spawning.

TRI 2-66

Comment noted. The map was not designed to represent legal boundaries.

TRI 2-67

Comment noted. See the following clarifications:

- The "existing agreements" referred to in the DEIS on page 2-46 is the *1995 Agreement Between the Muckleshoot Indian Tribe and the City of Tacoma Regarding the Green/Duwamish River System*.

- The effects of implementing the 1995 MIT/TPU Agreement are described in Chapter 7 of the HCP, and the environmental impacts are discussed in Section 4.0 of the DEIS.

- As noted in subsection 11.1 (Conditions) of the 1995 Agreement, the full Agreement goes into effect when Tacoma obtains construction financing for the Second Supply Project. As far as the Services can discern, Tacoma has fully complied with the terms of the Agreement to date by proceeding with the actions called for in the agreement that are not conditioned upon obtaining financing for the Second Supply Project (subsection 3.2.2, subsection 4.3, Section 6, Section 8). Note that subsection 11.1 does not require Tacoma to implement Section 7 of the MIT/TPU Agreement prior to Tacoma obtaining financing.

- The Services believe that Tacoma will implement the 1995 Agreement as described, and several of the measures contained in the HCP assume implementation of the Agreement.

- Full implementation of the 1995 Agreement should begin once Tacoma obtains Second Supply Project construction financing.

TRI 2-68

The status of Watershed Analysis in the Upper Green River Watershed as of February 1999 are presented in HCP Table 5-6. The Lester Watershed Analysis was initiated in October 1994, and formally approved in March 1998. A combined analysis of the Upper Green and Sunday Watershed

Administrative Units was initiated in July of 1995; this analysis has not yet received formal approval, but draft assessment reports and prescriptions have been produced and are available to provide guidance to watershed landowners until the final prescriptions are approved. A combined analysis of the Howard Hanson and Smay Watershed Administrative Units was initiated in October 1996. Draft prescriptions are available, but the draft assessment report has not yet been distributed to the Watershed Analysis participants. The official kickoff for the North Fork Watershed Analysis has not yet occurred. The FEIS has been modified to clarify the document location of status information for these analyses (FEIS Volume I, subsection 2.4.1, Upper Watershed Alternative A, No Action).

TRI 2-69

It is true that tributary streams in the Commercial Zone are, by designation, eliminated from the Natural Zone, but they are not excluded from management to protect and enhance water quality and fish habitat under the HCP. The protection of water quality and aquatic habitat on the Covered Lands is accomplished in large part by prohibiting timber harvest and other site disturbances in riparian areas. Along the mainstem of the Green River and Sunday Creek, the protected riparian areas are designated as Natural Zone under HCM 3-01B. Along the smaller tributary streams, the protected riparian areas are designated as no-harvest or partial-harvest buffers under HCMs 3-02A and 3-02B, respectively. The level of aquatic habitat protection is comparable under these three measures; the designations are only different because of non-aquatic management objectives that vary between the zones. The Natural Zone, which is entirely no-harvest, extends beyond 200 feet from the stream bank or CMZ (the area with the potential to influence water quality and fish habitat) to include late-seral coniferous forest for wildlife.

The late-seral forest in the Natural Zone makes up a major portion of the wildlife management strategy in the HCP. Conversely, less emphasis is placed on late-seral forest habitat in the Commercial Zone, so the area protected along the tributary streams extends no more than 200 feet. This distinction in management for wildlife habitat does not affect the overall effort to protect water quality and fish habitat.

TRI 2-70

References to unstable slopes in the DEIS were taken from Tacoma's Watershed Management Plan, which predates the Watershed Analysis Prescriptions. The FEIS has been modified for consistency with the HCP and current Watershed Analysis (FEIS Volume I, subsection 2.4.1, Upper Watershed Alternative A: No Action).

TRI 2-71

The DEIS indicates that Tacoma Water would comply with state Forest Practices Rules as well as Watershed Analysis under <u>any</u> of the alternatives analyzed. It is accurate to include these processes as part of the Proposed Action so that impacts could be adequately analyzed under Alternative B.

TRI 2-72

The DEIS (Table 2-16) presents only a brief summary of conservation measures contained in Tacoma's HCP. The Services urge the commenter to fully review the specific text and rationale for the conservation measures in the HCP.

The Services do not agree that "no benefits" result from this habitat conservation measure (HCM 3-03A). With Tacoma's participation in Watershed Analysis, five of the six watershed administrative units in the upper Green River basin have been either completed or prescriptions drafted, which cover 94 percent of Tacoma-owned land in the basin. Tacoma has provided map and water quality data, expert assessment, and prescription team members to conduct these analyses. The management prescriptions resulting from these analyses are developed by consensus of the prescription team, which is made up of landowners, tribes, resource experts, and agency representatives. The prescriptions are designed to provide the forest landowner and operator with as much flexibility as is possible while either minimizing, preventing, or avoiding a material, adverse effect to public resources (i.e., water, fish, wildlife, and capital improvements) while still maintaining a viable forest products industry.

See Specific Comment Responses TRI 2-73 and TRI 2-74.

TRI 2-73

Under the HCP, Tacoma Water has committed to developing Road Sediment Reduction Plans either cooperatively with other landowners through the Watershed Analysis process or independently of the state process if Watershed Analyses are not completed within the timeframe specified in the HCP. The intent of the plans to be produced as part of the Watershed Analysis process is to develop a basin-wide program to identify and repair road erosion problems and to reduce road-related fine sediment inputs. Such plans are consistent with the Services' support of basin-wide planning. Under Tacoma Water's HCP, road maintenance activities would be determined in cooperation with other landowners and approved by the DNR following completion of the road inventory.

The Services do not agree that it is necessary to set binding criteria for road maintenance. The appropriate method to treat individual sediment delivery points would vary with landform, slope, and site characteristics. For example, requiring that "no more than 50 feet of road length will contribute to a culvert that drains to a stream" could force road runoff to be discharged to an unstable slope to comply with the specific binding criteria. We are confident that erosion control solutions developed to solve a specific problem at a specific site by a qualified slope stability specialist or road engineer would provide better protection than the specification of binding global criteria. Results of this approach would be documented by compliance monitoring.

TRI 2-74

The DEIS presents only a brief summary of conservation measures contained in Tacoma Water's HCP. Full habitat conservation measures descriptions and commitments are presented in HCP Chapter 5. The Services urge the commenter to review the specific text and rationale for the conservation measures in the HCP.

Road construction would be conducted according to prescriptions developed through the Watershed Analysis process. This process involves compiling a historical landslide inventory, identification of landforms or slope configurations (Mass Wasting Map Units) that have historically been associated with high rates of mass wasting, evaluation of the effect of land management activities (including road location and configuration) on landslide rates within each Mass Wasting Map Unit, and development of prescriptions specific to each Mass Wasting Map Unit that must be applied to address concerns about erosion or slope stability. Based on these comprehensive, watershed-based reviews, prescriptions for some Mass Wasting Map Units recommend further site-specific slope stability analyses or geotechnical evaluations prior to construction of new roads. Given the context in which these evaluations occur, the Services do not agree that they give landowners (including Tacoma) "unlimited discretion to build roads."

TRI 2-75

The commenter correctly points out that Tacoma Water would comply with existing road agreements referred to in DEIS subsection 2.4.3, Upper Watershed Alternative C: No Commercial Timber Harvest under each of the other Upper Watershed Alternatives.

TRI 2-76

This statement in the DEIS was not intended to serve as a summary of the effects of recent land exchanges between the USFS and other landowners. It was simply provided to indicate that the amount of commercial timber harvesting on federal lands administered by the Mt. Baker-Snoqualmie National Forest in the Upper Green River Watershed has been reduced since implementation of the Northwest Forest Plan. Some of the recent land exchanges in the Upper Green River Watershed have involved Tacoma Water; however, it is important to note that all USFS lands acquired by Tacoma Water since implementation of the Northwest Forest Plan carry with them the covenant that they be managed according to that federal plan. Lands designated as no-harvest or restricted harvest under the Northwest Forest Plan will be managed in a similar manner now that Tacoma Water owns them. Also note, in accordance with HCM 3-01J, Tacoma Water would not practice commercial forestry on sites not suited to sustainable long-term timber production.

TRI 2-77

The statement referred to by the commenter is intended to provide a general description of the entire upper Green River basin relative to other portions of the Green River Watershed. Watershed Analyses conducted to date indicate the tributaries to the Green River generally have moderate to steep gradients (2 to 8%, or more) and are moderately to highly confined (i.e.,valley width is less than 4 times channel width), while the mainstem Green River is a lower gradient (0 to 2%) alluvial channel with occasional reaches that are confined by bedrock (Plum Creek Timber Company 1996; Plum Creek Timber Company 1997; U.S. Forest Service 1996). Although much of the mainstem Green River in the upper Green River basin is described as unconfined (i.e., valley width is more than 4 times channel width), the valley and floodplain are narrow compared to the alluvial valleys occupied by the middle and lower Green River downstream of RM 45.

TRI 2-78

The Services agree that additional clarification is necessary. The statement regarding turbidity increases is meant to indicate that turbidity is generally greater during high flow events than during low flows. Subsection 3.6.5.2 of the DEIS describes the influence of land use activities and sources of fine sediment in the Upper Green River Watershed that influence turbidity. This discussion includes forest management activities (including road construction, maintenance, and use), but does not attempt to attribute specific “increases” to individual landowners; Chapter 3 of the DEIS is simply meant to describe the affected environment. Tacoma activities covered by the HCP and ITP,

including those that could contribute to increased levels of turbidity, are discussed in detail in subsection 2.3 of the HCP.

TRI 2-79

Unlike publications containing independently authored and published papers, the Watershed Analysis reports contain both compilations of group efforts and individually authored materials. The intent of this citation is to assist the reader in finding the specified materials. With a process such as Watershed Analysis, individual authors are not always identified, and modules are often prepared by multiple authors. Therefore most technical editors have preferred to cite the organization responsible for sponsoring, compiling, and producing the final report so that a reader may locate a reliable source of original information.

TRI 2-80

The effects of the Proposed Action on spring flows in the Green River are described for average year conditions in Figures 4-4a, 4-4b, dry year conditions in Figures 4-5a and 4-5b, and wet year conditions in Figures 4-6a and 4-6b. Analyses of the effects of the flow changes over a 32-year record of daily flows are presented for:

- instream migration of juvenile chinook, coho, chum, and steelhead;
- mainstem rearing habitats for chinook, coho, chum, and steelhead;
- side channel rearing habitats; and
- chinook, coho, and steelhead spawning and incubation.

Several of the analyses (for example, chum rearing and steelhead spawning) specifically describe the trade-offs involved between spring storage and flow augmentation; other analyses (for example, coho rearing) present the effect of daily flow changes on a year-round basis. Results of the analyses are described in the DEIS subsection 4.2.6.2 and are presented in the DEIS, Appendix B, Fisheries Data and Models.

These analyses demonstrate resource trade-offs involved in flow management decisions. The effects of future flow management decisions on aquatic resources would be monitored (see HCP Chapter 6), and the results of the monitoring would provide feedback to allow resource managers to adjust storage strategies to achieve resource protection objectives. See General Comment Response 26 for further discussion regarding adaptive management.

The Services agree that "there is never enough water to fully protect all life stages and all species in all seasons." Even a natural flow regime will change the level of habitat availability on a daily or seasonal basis. As described in Chapter 7 of the HCP, Tacoma's water withdrawals reduce the availability of habitat for selected species. Tacoma acknowledges the effects of its water withdrawals and proposes a variety of resource protection measures. As described in Chapter 5 of the HCP, these measures include restrictions on water withdrawals, and fish passage facilities and structural changes to provide increased flexibility in Howard Hanson Dam operations. The Services must consider whether measures proposed in Tacoma's HCP would provide sufficient resource protection in light of the impacts of its water withdrawals.

TRI 2-81

The DEIS subsection referred to by the commenter describes only the environmental consequences of Tacoma's activities under each of the three alternatives. The commenter correctly identifies groundwater withdrawals by others as cumulative effects; FEIS subsection 4.4.3 has been modified to reflect this issue.

The Services share the commenter's concern that expanded groundwater withdrawals in the future could further reduce flows in the mainstem Green River. Reduced groundwater recharge and groundwater withdrawals have been linked to declining flows in two major tributaries to the Green River, Soos, and Newaukum Creeks (Culhane et al. 1995). Ecology has closed the Green River basin to further surface and groundwater withdrawal permits. However, groundwater withdrawals by private wells serving individual residences are exempt from the closure and may still be developed.

Tacoma's commitment to reduce surface water withdrawals under the First Diversion Water Right claim to maintain specific instream flows as measured at the Auburn gauge would help offset flow reductions resulting from the activities of other entities. For example, instream flows from Newaukum Creek may continue to decline in the future, but Tacoma's commitment to meet instream flows at the Auburn gauge would remain constant. The net result would be that Tacoma's ability to withdraw water under the First Diversion Water Right claim would be restricted more frequently, as water that would have previously been available must now be left in the Green River to make up for decreased flow contributions from Newaukum Creek.

TRI 2-82

See Specific Comment Response TRI 2-5.

TRI 2-83

See General Comment Response 27 for a discussion of natural flow variation.

TRI 2-84

The IFIM is a tool used in determining instream flow requirements, and as such, has inherent strengths and weaknesses. In response to comments received during the scoping phase of the Additional Water Storage Project, Tacoma Water and the USACE conducted additional studies of juvenile salmon migration, side channel connectivity, and steelhead incubation in the Green River to supplement the IFIM study conducted by Ecology.

TRI 2-85

The IFIM remains the method generally used by Ecology and the WDFW (Washington Department of Ecology 1998), as well as the Services, to assess instream flow requirements. Ecology used the IFIM in its analyses of Green River instream flow requirements in 1989, and continues to use the method to assess instream flow requirements in other river basins in Washington State.

TRI 2-86

See Specific Comment Response TRI 2-8.

TRI 2-87

Comment noted. See the following responses for additional clarification.

TRI 2-88

See Specific Comment Response TRI 2-79 for a discussion of citation protocols.

The discussion of turbidity and fine sediment in the Upper Green River Watershed relies primarily on the Lester Watershed Analysis Report because to date it is the only Watershed Administrative Unit for which a Watershed Analysis has been completed and approved. A draft copy of the Upper Green/Sunday Watershed Analysis report has been obtained since distribution of the DEIS; the climate, soils, geology, mass wasting map units, and channel types delineated for the Upper

Green/Sunday analysis are generally similar to those identified for the Lester Analysis, supporting extrapolation of a single report to the larger basin. Hazard ratings and triggering mechanisms identified in the draft prescriptions for the Lester, Upper Green/Sunday, and Howard Hanson/Smay Watershed Administrative Units are also generally consistent.

TRI 2-89

Although the commenter correctly notes that none of the watershed assessment reports specifically relate current fine sediment inputs from surface erosion or mass wasting to historical inputs, we do not agree that the documents cited do not support the analysis of fine sediment production in the Green River. The number and total area of landslides delivering sediment to stream channels during the period from 1968 to 1978 was greater than the number and total area of landslides delivering sediment to streams during the period from 1979 to 1995, despite the fact that the highest peak streamflows occurred in the 1990s (Plum Creek Timber Company 1996). Although we recognize that there may be a great deal of variability in the slide depth as well as the proportion of fine materials delivered by individual landslides, we are comfortable with the general assumption that a greater slide area corresponds with greater sediment delivery. Causal mechanism reports for mass wasting mass unit prescriptions developed for the Lester Watershed Analysis clearly identify "fine and coarse sediment" as input variables of concern for mass wasting prescriptions.

In addition, the Lester Surface Erosion Module notes that "many of the roads [in the Lester WAU] were built during … the 1970s." Numerous researchers have shown that sediment inputs are significantly higher in the first few years following construction (Furniss et al. 1991; U.S. Forest Service 1981; Krammes and Burns 1976). Indeed, the assumption that sediment inputs are greatest in the first 2 years following road construction is one of the primary assumptions utilized in the road erosion model applied in assessments conducted using the protocols described in the Washington Forest Practices Board Manual for Watershed Analysis (Washington Forest Practices Board 1997).

TRI 2-90

The commenter is correct; the cited document does not explicitly state that "mass wasting was the largest source of fine sediment to the river." Although the Lester Surface Erosion Module report (Plum Creek Timber Company 1996) provides an explicit estimate of fine sediment delivery, no attempt to construct an overall sediment budget that included inputs from all sources (such as mass wasting, surface erosion, and bank erosion) was described, thus the relative contribution of fine

sediment from landslides is unknown. However, given the number of landslides, the proportion of slides delivering to stream channels, and the estimated continued high sediment delivery from landslide scarps, we believe that landslides represent an important, if not the most important, source of fine sediment in the Upper Green River Watershed.

TRI 2-91

Comment noted. However, a valid assessment of the contribution of fine sediment by landslides must also consider the initial volume delivered to the channel.

TRI 2-92

We appreciate the commenter's in-depth discussion of potential sources of error in the Lester Watershed Analysis Surface Erosion Module. However, independent research is generally not part of the Watershed Analysis process. The module report for the Lester Watershed Administrative Unit identifies the assumptions used to produce the estimates of fine sediment delivery from background, roads, and mass wasting scarps, and explicitly states that confidence in the work product is moderate at best. The intent of both the Lester Watershed Analysis Surface Erosion Module, as well as the discussion of the affected environment in Tacoma's DEIS, is not to quantify absolute amounts of sediment delivered from the various sources, but simply to identify important sources and contributing activities so that prescriptions to address each issue can be developed. In the upper Green River basin both roads and mass wasting are clearly important sources of fine sediment.

TRI 2-93

See Specific Comment Response TRI 2-91.

TRI 2-94

Comment noted.

TRI 2-95

Comment noted.

TRI 2-96

Comment noted.

TRI 2-97

Reduction of fine sediment inputs from roads located on Tacoma lands is one of the primary goals of the Road Construction and Maintenance Measures contained in Tacoma's HCP.

TRI 2-98

The statement referred to in the DEIS refers to "several subwatersheds," and was not intended to refer to all subwatersheds or to suggest that timber harvest and road building in the upper watershed has ceased.

TRI 2-99

The Services believe that the DEIS text agrees with the commenters' observations. The previous sentences in the paragraph noted describe the results of the landslide inventory referred to by the commenter and link them to changes in sediment stored in stream channels. However, the landslide inventory conducted during Watershed Analysis does not rely on direct inspection of the failure sites before and after the landslide event, but simply identifies an association between the number of landslides and their location relative to management activities such as the presence of roads or harvest units. Regardless of how strong a correlation is noted, such an analysis cannot be used to confirm a cause-and-effect relationship. However, as noted in the HCP, the observed strong correlation between landslides and land management activities suggests that land management may be the most likely cause of the observed increase in sediment production.

TRI 2-100

The Services appreciate the commenter supplying additional information. As this information was not available at the time the DEIS was written, it was not incorporated into the draft document. The data presented by the commenter does appear to indicate that sediment delivery from landslides increased in the period from 1989 and 1996 in the Howard Hanson and Smay Creek Watershed Administrative Units. As noted previously, given the overall similarity in geology, soils, climate, topography, and land use, these data would also suggest that sediment delivery increased in the other Watershed Administrative Units within the Upper Green River Watershed. However, such a conclusion should also consider the frequency and magnitude of associated storm and flow events.

As noted in the DEIS, it is believed that the combination of large runoff events in association with management activities is the most likely cause of increased sediment delivery. High flow events

occurred in association with storms in November 1995 and February 1996, after the Lester Watershed Analysis had been completed. These storms produced flood flows with a return interval of more than 100 years in nearby basins, and resulted in the maximum reservoir elevation observed behind Howard Hanson Dam since its construction (Wiggins et al. 1996). It is not surprising that such events would be associated with high levels of landslide activity.

TRI 2-101

The DEIS subsection 3.8 is further divided into two subsections. The DEIS subsection cited by the commenter, 3.8.1, Fish Species of Special Interest, provides a brief discussion of the status and life history phases of the nine fish species that would be covered by Tacoma's ITP. Subsection 3.8.2, Fish Habitat Conditions, provides a brief discussion of existing fish habitat conditions in the Green River basin, including the role of coarse and fine sediments.

TRI 2-102

The contribution of surface erosion and landslides associated with forest roads and harvest units are described under the Forest Harvest portion of DEIS subsection 3.8.2.1, Historic Influences on Fish Habitat Conditions.

Current fish habitat conditions have been described in a general manner to provide the lay reader with basic ecological principles that form the assumptions for the subsequent analyses. It is provided primarily as background information. The description of the impacts that changes in the coarse and fine sediment regime may have on aquatic habitats and fish in the Green River basin is also general because there is currently little specific information available on actual habitat conditions in the Green River basin.

With the exception of the Lester Watershed Analysis, which included quantitative data on less than 1 mile of habitat in the mainstem Green River between RM 76 and RM 84, no published habitat data on the Green River are available. Furthermore, even if habitat data were available, documenting the influence of those conditions on fish in the Green River would require intensive biological studies. In the absence of such data, we can only assume that studies documenting the negative effects of increased sediment supply on anadromous fish that have been conducted elsewhere in the Pacific Northwest are representative of conditions in the Green River basin.

TRI 2-103

See Specific Comment Response TRI 2-102.

TRI 2-104

The Services believe that Alternative B would provide an increased level of protection with regard to mass wasting and surface erosion as compared to existing Washington Forest Practices Regulations (Alternative A) as well as new regulations proposed under the Forests and Fish Report (see FEIS Volume I, subsection 2.5.2, Forests and Fish Report) for the following reasons:

- Tacoma's HCP provides no-harvest buffers that substantially exceed those required under existing regulations or the Forests and Fish Report for all streams including Type 5 channels, headwall scarps, and seeps and springs that are often sites where debris flows initiated.

- Under the HCP, Tacoma commits to participating in the development of cooperative Road Sediment Reduction Plans through Watershed Analysis, and further commits to independently completing a Road Sediment Reduction Plan for roads on the Covered Lands within 2 years of issuance of the ITP in the event that plans undertaken as a result of Watershed Analysis are not yet complete. This timeline means that Road Sediment Reduction Plans for all of the Covered Lands would be completed and implemented much faster than completion and implementation of similar plans under the Forests and Fish Report.

- Under its HCP, Tacoma has also committed to completion of a landslide inventory and development of prescriptions specific to the Covered Lands in Watershed Administration Units where Watershed Analysis has not been completed within 2 years of issuance of the ITP.

- Tacoma has committed to using full bench construction techniques on side slopes steeper than 60 percent even where Watershed Analysis prescriptions or state regulations might permit less restrictive construction techniques.

Tacoma has voluntarily committed to maintain gravel surfacing on all mainline, primary, and secondary roads on the Covered Lands and to discontinue its log-hauling operations when there is a potential for water quality impacts that would adversely affect fish. These restrictions are not currently required under existing state regulations, Watershed Analysis, or under the proposed Forests and Fish Report.

TRI 2-105

The commenter does not state where the DEIS purportedly indicates that Watershed Analysis prescriptions prohibit logging or road construction on potentially unstable slopes. The DEIS clearly states that "Watershed Analysis prescriptions developed to date require landowners to avoid unstable landforms, <u>if possible</u>" (DEIS Subsection 4.3.2.1) and further states that "Under Upper Watershed Analysis Alternative B, Tacoma Water would continue to manage unstable lands as prescribed by Watershed Analysis…thus no difference in sediment delivery by management-related landslides is expected…" (DEIS subsection 4.3.2.2).

TRI 2-106

The Services appreciate the commenters' providing a reference to the 1998 Montgomery et al. study of landslide initiation. That publication was not available when the Lester Watershed Analysis prescriptions were developed. However, the Services believe that the Watershed Analysis approach is designed to facilitate incorporation of such information into the prescription process. It is expected that new information on landslide initiation and hazard will be used to modify prescriptions through the 5-year review process, or by qualified slope stability specialists during their review and design of site-specific road construction plans for unstable landforms. We feel that an adaptive management approach that relies on continued evaluation of the effectiveness of prescriptions, as well as periodic review of those prescriptions in light of the best available science, provides adequate habitat protection for the HCP-Covered Species.

TRI 2-107

The Services would monitor Tacoma's compliance with all measures under the HCP, including compliance with both draft and final Watershed Analysis prescriptions, which are a component of the HCP.

TRI 2-108

The Services respectfully disagree that implementation of the road construction and maintenance measures required under Tacoma's HCP represents a scenario in which road sediment delivery could increase. By definition, corrective measures identified and implemented under a Road Sediment Reduction Plan would not allow increased sediment delivery. In addition, Tacoma's commitments to: 1) mulch or seed steep road cuts and fills near water crossings; 2) maintain gravel surfacing on all mainline, primary, and secondary roads; 3) restrict its wet-weather hauling where there is a potential for water quality impacts that adversely affect fish; 4) maintain vegetation along roadsides; and 5) abandon unneeded roads on Covered Lands, are all expected to reduce sediment delivery from roads on Covered Lands over the long term.

TRI 2-109

Establishment of target criteria for sediment delivery in the context of long-term management is a sound idea. However, we believe it is not currently feasible to establish realistic sediment delivery targets for specific forestry activities. First, there exists no detailed quantitative information on natural rates of erosion or sedimentation in any of the watersheds contained in the HCP lands. Second, because of the stochastic nature of erosion and sediment transport, and the decadal lag times in sediment storage that can affect sediment transport rates, it is not possible to establish accurate monitoring targets over periods of years or even decades. Third, it is not known in quantitative terms what levels of erosion or sedimentation are best for salmonid habitats, particularly given the recognized role of natural disturbances in aquatic ecosystem development (Resh et al. 1988; Reeves et al. 1995). The 50 percent of background target utilized in Watershed Analysis is based on studies that have indicated that increases of this magnitude are detectable statistically (Washington Forest Practices Board 1997).

As stated in the DEIS, the Services believe that the environmental consequences of implementing the conservation measures contained in the HCP would be a reduction in turbidity and delivery of coarse and fine sediment from the Covered Lands over the long term. The intent of the HCP is not to restore aquatic habitat to natural conditions, but, as quoted by the commenter, "to return the geomorphic processes of sediment delivery, large woody debris inputs and to conditions that <u>more closely approximate</u> natural levels."

TRI 2-110

Specific cause-and-effect data linking discrete forest management activities in the Upper Green River Watershed to documented changes in water quality, sediment delivery, or drainage extension are not available. The text cited by the commenter is therefore general, and provided primarily as context that illustrates how the forestry activities addressed by the HCP would affect geomorphic processes based on scientific studies conducted elsewhere in the Pacific Northwest. The anticipated impact of implementing the HCP would be "…to reduce sediment and dissolved solid delivery to streams resulting from road runoff or bridge or culvert failure," as noted in DEIS subsection 4.3.4.2.

TRI 2-111

Unfortunately, because we do not currently have quantitative data on roads and the associated drainage system for most of the Upper Green River Watershed, the anticipated effects of each Alternative on water quality and quantity can only be described qualitatively.

TRI 2-112

See Specific Comment Responses TRI 2-109 and TRI 2-111.

TRI 2-113

The commenter correctly notes that the Erosion and Sedimentation discussion under subsection 4.3.6.2 does not explicitly describe the effects of Alternative B on erosion and sedimentation. The FEIS has been modified to reflect this change.

As noted in the subsection titled Effects on Fish Habitat, the management activities and prescriptions implemented under Alternative B would be similar to those described for Alternative A. The effects would also be similar to those described for Alternative A (DEIS subsection 4.3.6.1) under the paragraph titled Erosion and Sedimentation: "sediment delivery associated with management-related mass wasting and surface erosion would be expected to drop below levels experienced in recent decades … Over time, reducing management-related sediment inputs would be expected to benefit salmon and steelhead by reducing substrate embeddedness and the amount of fine sediment (less than 0.85 mm) in spawning gravels, particularly in low to moderate gradient channels."

TRI 2-114

See Specific Comment Response TRI 2-113.

TRI 2-115

See General Comment Response 6. Tacoma was provided a copy of the Forest Practices Act cited by the commenter for review. If this proposed ITP is approved and the HCP is implemented, Tacoma would require that all road maintenance or construction activities undertaken on the Covered Lands comply with measures outlined in the HCP.

TRI 2-116

References noted.

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FIGURES

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5. Habitat Conservation Measures to be Implemented Under the HCP

The Green River has been and will continue to be the main source of water for the City of Tacoma. The Green River likewise represents a regionally important ecosystem that supports economically, culturally, and recreationally significant populations of anadromous and resident salmonids (see Chapter 4). This chapter describes specific habitat conservation measures that Tacoma is financially committed (either solely or in combination with others) to implement as part of this Habitat Conservation Plan (HCP).

Although Tacoma is concerned about ensuring certainty in meeting existing and future demands for water, Tacoma has long recognized that potential conflicts exist between meeting such demands and the needs of the ecosystem of the Green River basin. As a result, Tacoma has taken an active part in identifying impacts related to its operations and activities, and developing measures to avoid, minimize, or otherwise mitigate for such impacts. These measures have been developed through many years of active discussions with Tribal, federal, state, county, and private interest group representatives, and meetings and discussions with individuals comprising scientific advisory groups formed to address technical environmental issues. Because Howard Hanson Dam (HHD) is a major influence on the structure and function of the Green River ecosystem, and HHD operations affect Tacoma's water withdrawals, many of the measures were generally developed in close collaboration with the U.S. Army Corps of Engineers (USACE).

An important backdrop to this list of conservation measures is understanding that, since the 1980s, Tacoma has been actively working with the Muckleshoot Indian Tribe (MIT) to remedy past fish and wildlife damages related to the construction and operation of the Tacoma Supply Intake at River Mile (RM) 61.0 (Headworks) diversion. The 1995 Muckleshoot Indian Tribe/Tacoma Public Utility[1] Mitigation Agreement (MIT/TPU Agreement) is a substantial commitment by Tacoma directed toward the implementation of a suite of measures that were considered by both parties to compensate for all impacts to the fishery resources associated with Tacoma's operations in the Green River, including the First Diversion Water Right Claim (FDWRC) and the Second Division Water Right (SDWR). The effects of the joint USACE and Tacoma HHD Additional

[1] Tacoma Public Utility, Water Division is now known as Tacoma Water (Tacoma). Since the agreement is a well-recognized document, it will continue to be referenced as the MIT/TPU Agreement.

Water Storage (AWS) project were not addressed by the MIT/TPU Agreement.

In addition to fish and wildlife habitat enhancement measures, Tacoma has committed to: 1) construct a fish ladder and adult collection and trap-and-haul facility to provide passage to adult fish around the Headworks and HHD; 2) higher minimum flows (greater than Washington State instream flow requirements); and 3) provision for either a fish restoration facility designed to rear salmonids using "naturalized" procedures (see HCM 2-05), or comparable funding of other measures targeted toward fisheries enhancement in the Green/Duwamish river system. These measures directly benefit the species for which Incidental Take Permit (ITP) coverage is being sought. Tacoma has also committed to contribute funds for activities conducted by other parties (e.g., MIT, USACE[2]), for the benefit of fish and wildlife resources in the Green River.

Tacoma's habitat conservation measures and stewardship actions are listed in Table 5-1. Because a number of the measures have been jointly sponsored by Tacoma and other parties, the measures can be divided into three types, depending on their focus and where and how benefits are directed:

1) implementation of measures designed to offset or compensate for impacts resulting from a Tacoma water withdrawal action (e.g., withdrawal of water under SDWR) – designated Type 1 measures;
2) contribution of funds and/or implementation of measures designed to offset or compensate for impacts resulting from a non-Tacoma action (e.g., financial support of gravel nourishment measures to offset effects of HHD flood control) – designated Type 2 measures; and
3) implementation of mitigation/restoration measures in the Green River watershed designed to offset impacts of Tacoma non-water withdrawal activities (e.g., forestry operations in the upper watershed) – designated Type 3 measures.

[2] The cost-share arrangement referenced in this document between Tacoma and the USACE is subject to changes in the Water Resource Development Act or other Congressional funding initiatives that may adjust the cost-share formula between the parties.

Table 5-1. Tacoma Water (Tacoma) habitat conservation measures (HCM) to be implemented under the HCP.

Habitat Conservation Measure	Title	Description	Type of Measure[1]	U.S. Army Corps of Engineers AWS Project Number [2]
HCM 1-01	**FDWRC** ~~Minimum~~ Instream Flow ~~Under FDWRC~~ **Commitment**	**Guaranteed continuous** ~~Minimum~~ flow maintained at Auburn, WA gage (stipulated in the MIT/TPU Agreement)	Type 1	N.A.
HCM 1-02	Seasonal Restrictions on SDWR	Minimum flow **restrictions on SDWR withdrawals** ~~maintained~~ at Auburn and Palmer, WA gages (stipulated in the MIT/TPU Agreement)	Type 1	N.A.
HCM 1-03	Tacoma Headworks Upstream Fish Passage Facility	Construction/operation of upstream fish passage facility at Headworks	Type 1	N.A.
HCM 1-04	Tacoma Headworks Downstream Fish Bypass Facility	Installation of screen and fish bypass facility at Headworks	Type 1	N.A.
HCM 1-05	Tacoma Headworks Large Woody Debris (LWD)/Rootwad Placement	Installation of LWD, rootwads and boulders to enhance rearing capacity in Headworks inundation pool	Type 1	N.A.
HCM 2-01	HHD Downstream Fish Passage Facility	Construction/operation of downstream fish passage facility at HHD	Type 2	Mitigation and Restoration FP-A8
HCM 2-02	HHD Non-Dedicated Storage and Flow Management Strategy	Provide opportunity to manage springtime water storage and release at HHD to minimize impacts to salmonids	Type 2	N.A.
HCM 2-03	Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Measures	Rehabilitate fish and wildlife habitat in the reservoir inundation zone, riparian areas upstream and downstream of HHD	Type 2	Mitigation and Restoration MS-02, 04, 08 TR-01, 04, 05, 09 VF-05
HCM 2-04	Standing Timber Retention	Retention of 166 acres of deciduous, 48 acres mixed, and 15 acres of conifer forest in the HHD pool inundation zone	Type 2	N.A.

Table 5-1. Tacoma Water (Tacoma) habitat conservation measures (HCM) to be implemented under the HCP.

Habitat Conservation Measure	Title	Description	Type of Measure[1]	U.S. Army Corps of Engineers AWS Project Number [2]
HCM 2-05	Juvenile Salmonid Transport and Release	Transport and release of juvenile salmonids above HHD if determined to be beneficial	Type 2	N.A.
HCM 2-06	Low Flow Augmentation	Option to provide an additional 5,000 ac-ft of water for low flow augmentation	Type 2	USACE 1135
HCM 2-07	Side Channel Re-connection Signani Slough	Re-connect and rehabilitate 3.4 acres of off-channel habitat in Signani Slough (RM 60)	Type 2	Restoration VF-04
HCM 2-08	Downstream Woody Debris Management Program	Introduce woody debris into Green River downstream of Headworks	Type 2	Restoration MS-09
HCM 2-09	Mainstem Gravel Nourishment	Provide up to 3,900 yd^3 gravel into Green River downstream of Headworks	Type 2	Restoration LMS-01, 02, 03, 04
HCM 2-10	Headwater Stream Rehabilitation	Creation of off-channel habitat, installation of LWD/rootwads in Green River, N F Green River, and eight tributaries	Type 2	Restoration MS-03 TR-06, 07
HCM 2-11	Snowpack and Precipitation Monitoring	Install up to three snow pillows in the upper Green River basin	Type 2	N.A.
HCM 3-01 — UPLAND FOREST MANAGEMENT MEASURES				
HCM 3-01A	Upland Forest Management Measures	Management of Tacoma lands within the HCP according to natural, conservation, or commercial designations	Type 3	N.A.
HCM 3-01B	Natural Zone	No timber harvesting except to modify fish or wildlife habitat or remove danger trees along roads	Type 3	N.A.
HCM 3-01C	Conservation Zone	No even-aged harvesting in conifer-dominated stands and no harvesting (except danger tree removal along roads and fish and wildlife habitat modifications) in conifer-dominated stands older than 100 years	Type 3	N.A.
HCM 3-01D	Commercial Zone	Coniferous forests will be managed on an even-aged rotation of 70 years	Type 3	N.A.

Table 5-1. Tacoma Water (Tacoma) habitat conservation measures (HCM) to be implemented under the HCP.

Habitat Conservation Measure	Title	Description	Type of Measure[1]	U.S. Army Corps of Engineers AWS Project Number [2]
HCM 3-01E	Hardwood Conversion	Stands in the conservation and commercial zones dominated by hardwood on sites capable of producing conifers may be converted to conifers by clearcutting	Type 3	N.A.
HCM 3-01F	Salvage Harvesting	Salvage timber harvesting only in forested areas of the Commercial Zone and stands in the Conservation Zone under 100 years old affected by wind-throw, insect infestation, disease, flood or fire according to set prescriptions	Type 3	N.A.
HCM 3-01G	Snags, Green Recruitment Trees and Logs	Tacoma will retain all safe snags and at least four green recruitment trees and four logs per acre, where available	Type 3	N.A.
HCM 3-01H	Harvest Unit Size	Even-aged harvest units will not exceed 40 acres in size	Type 3	N.A.
HCM 3-01I	Even-aged Harvest Unit Adjacency Rule	Even-aged harvesting will occur when the surrounding forest land is fully stocked with trees a minimum of 5 years old and 5 feet high	Type 3	N.A.
HCM 3-01J	Harvest Restrictions on sites with Low Productivity	Timber harvesting will occur only on lands with a Douglas-fir 50-year site index of greater than 80	Type 3	N.A.
HCM 3-01K	Contractor and Logger Awareness	Contractor, loggers, and forestry workers operating in the Upper HCP Area will be required to comply with relevant HCP measures	Type 3	N.A.
HCM 3-01L	Logging Slash Disposal	Slash disposal will not be burned unless burning is part of habitat modification	Type 3	N.A.
HCM 3-01M	Reforestation	All even-aged stands will be re-planted with 300-400 suitable trees per acre by the first spring following harvest	Type 3	N.A.
HCM 3-01N	Harvest on Unstable Slopes	Tacoma will identify potentially unstable landforms and apply general prescriptions developed by Watershed Analysis or site-specific prescriptions developed by a slope stability specialist	Type 3	N.A.

Table 5-1. Tacoma Water (Tacoma) habitat conservation measures (HCM) to be implemented under the HCP.

Habitat Conservation Measure	Title	Description	Type of Measure[1]	U.S. Army Corps of Engineers AWS Project Number [2]
HCM 3-02 — RIPARIAN MANAGEMENT MEASURES				
HCM 3-02A	No-Harvest Riparian Buffers	Tacoma will retain no-harvest buffers along all streams and wetlands in the Upper HCP Area	Type 3	N.A.
HCM 3-02B	Partial Harvest Riparian Buffers	Tacoma will retain partial-harvest riparian buffers outside no-harvest buffers on Type 3 and Type 5 streams	Type 3	N.A.
HCM 3-03 — ROAD CONSTRUCTION AND MAINTENANCE MEASURES				
HCM 3-03A	Watershed Analysis	Tacoma will participate in all Watershed Analyses performed according to the WFPB within the HCP area	Type 3	N.A.
HCM 3-03B	Road Maintenance	Tacoma participate in the development of a Road Sediment Reduction Plan describing the priorities and schedule for road maintenance, improvement and abandonment activities that will be implemented to reduce road sediment inputs.	Type 3	N.A.
HCM 3-03C	Roads Construction on Unstable Landforms	Tacoma will implement all draft and final mass wasting prescriptions specific to new road construction in WAUs where watershed analyses are approved or pending. In WAUs where assessments have not been completed within 2 years following issuance of the ITP, Tacoma will complete a slope stability analysis and develop site-specific prescription for road construction.	Type 3	N.A.
HCM 3-03D	Roads on Side Slopes Greater Than 60 Percent	Tacoma will use full bench construction with no side casting of excavated materials on side slopes greater than 60 percent	Type 3	N.A.
HCM 3-03E	Erosion Control	Tacoma will place mulch and/or grass seed on all road cuts and fills with slopes over 40 percent or near water crossings as well as in areas of severe erosion/slumping danger or above and below roads	Type 3	N.A.

Table 5-1. Tacoma Water (Tacoma) habitat conservation measures (HCM) to be implemented under the HCP.

Habitat Conservation Measure	Title	Description	Type of Measure[1]	U.S. Army Corps of Engineers AWS Project Number [2]
HCM 3-03F	Stream Crossings	When constructing roads through riparian areas, Tacoma will minimize right-of-way clearing, cross streams at right angles, minimize stream disturbances and side-casting of excavated materials, and provide for upstream and downstream passage in fish-bearing streams	Type 3	N.A.
HCM 3-03G	Road Closures	Tacoma will maintain a locked gate to restrict road use except where the USFS requires roads to be open	Type 3	N.A.
HCM 3-03H	Roadside Vegetation	Tacoma will maintain low-growing vegetation along roads to stabilize soils and minimize erosion	Type 3	N.A.
HCM 3-03I	Road Abandonment	Tacoma will abandon roads in the HCP area that are no longer needed for watershed management, forestry operations, or HCP implementation according to a specified schedule	Type 3	N.A.
HCM 3-03J	Culvert Improvements	Tacoma will inventory all roads in the HCP area and identify all culverts that block fish passage within 1 year of issuance of ITP, plans to eliminate blockages will be made within 2 years, and all blockages will be eliminated within 5 years of issuance of an ITP	Type 3	N.A.
HCM 3-04 — SPECIES SPECIFIC MANAGEMENT MEASURES				
HCM 3-04A	Grizzly Bear Den Site Protection	Tacoma will not fell timber, yard timber, construct roads, or apply aerial pesticides within 1 mile of any known active grizzly bear den from 1 October through 31 May; and will contact the USFWS prior to any similar activities within 3 miles of a known den at other times of the year	Type 3	N.A.
HCM 3-04B	Grizzly Bear Sightings	Tacoma will suspend all management activities under its control in the Upper HCP Area within 1 mile of confirmed grizzly bear sightings for 21 days unless activities are necessary for the operation of the water supply project	Type 3	N.A.

Table 5-1. Tacoma Water (Tacoma) habitat conservation measures (HCM) to be implemented under the HCP.

Habitat Conservation Measure	Title	Description	Type of Measure[1]	U.S. Army Corps of Engineers AWS Project Number [2]
HCM 3-04C	Grizzly Bears and Roads	Tacoma will not construct roads across non-forested blueberry and black huckleberry fields, meadows, avalanche chutes, or wetlands in the Upper HCP Area	Type 3	N.A.
HCM 3-04D	Grizzly Bear Visual Screening	Tacoma will retain visual screens along preferred grizzly bear habitat or along roads within 1 mile of said habitat if a grizzly bear is documented in the Green River watershed	Type 3	N.A.
HCM 3-04E	Grizzly Bears and Trash	Tacoma will take measures to prevent the dumping of trash that may attract grizzly bears in the upper watershed	Type 3	N.A.
HCM 3-04F	Grizzly Bears and Firearms	Tacoma will prohibit firearms within vehicles of contractors working for Tacoma in the Upper HCP Area (except in special cases)	Type 3	N.A.
HCM 3-04G	Gray Wolf Den Site Protection	Tacoma will not fell timber, yard timber, construct roads, blast, or apply aerial pesticides within 1.0 mile of any known active gray wolf den from 15 March through 15 July and within 0.25 mile of any known active gray wolf "first" rendezvous sites from 15 May through 15 July	Type 3	N.A.
HCM 3-04H	Pacific Fisher Den Site Protection	Tacoma will not fell timber, yard timber, construct roads, blast, or apply aerial pesticides within 0.5 mile of any known active Pacific fisher den from 1 February through 31 July	Type 3	N.A.
HCM 3-04I	California Wolverine Den Site Protection	Tacoma will not fell timber, yard timber, construct roads, blast, or apply aerial pesticides within 0.5 mile of any known active wolverine den from 1 October through 31 May	Type 3	N.A.
HCM 3-04J	Canada Lynx Den Site Protection	Tacoma will not fell timber, yard timber, construct roads, blast, or apply aerial pesticides within 0.25 mile of any known active Canada lynx den from 1 May through 31 July	Type 3	N.A.

Table 5-1. Tacoma Water (Tacoma) habitat conservation measures (HCM) to be implemented under the HCP.

Habitat Conservation Measure	Title	Description	Type of Measure[1]	U.S. Army Corps of Engineers AWS Project Number [2]
HCM 3-04K	Seasonal Protection of Peregrine Falcon Nests	Tacoma will not fell timber, yard timber, construct roads or apply aerial pesticides within 0.5 mile, or blast within 1.0 mile of any known active peregrine falcon nest from 1 March through 31 July	Type 3	N.A.
HCM 3-04L	Long-Term Protection of Peregrine Falcon Nest Sites	Tacoma will not fell timber or alter habitat within 100 feet of any known peregrine falcon nest site or potential nest cliff greater than 75 feet in height in the Upper HCP Area; and Tacoma will retain large potential perch trees within 660 feet of known peregrine nests	Type 3	N.A.
HCM 3-04M	Seasonal Protection of Bald Eagle Nests and Communal Winter Night Roosts	Tacoma will not fell timber, yard timber, construct roads, or alter habitat within 0.25 mile or aerial spray within 0.5 mile or blast within 1.0 mile of any known active bald eagle nest from 1 January through 15 August or active communal winter night roost at sensitive times of day from 15 November through 15 March	Type 3	N.A.
HCM 3-04N	Long-Term Protection of Bald Eagle Nests and Communal Winter Night Roosts	Tacoma will not fell timber or otherwise alter habitat within ~~330~~ **400** feet of any known bald eagle nest or communal winter night roost in the Upper HCP Area	Type 3	N.A.
HCM 3-04O	Seasonal Protection of Northern Spotted Owl Nests	Tacoma will not fell timber, construct roads or apply aerial pesticides within 0.25 mile, or blast within 1.0 mile of the activity center of any known northern spotted owl pair from 1 March through 30 June	Type 3	N.A.
HCM 3-04P	Long-Term Protection of Northern Spotted Owl Nests	Tacoma will not fell timber or otherwise alter habitat within 660 feet of the activity center of any known northern spotted owl pair or resident single in the Upper HCP Area	Type 3	N.A.

Table 5-1. Tacoma Water (Tacoma) habitat conservation measures (HCM) to be implemented under the HCP.

Habitat Conservation Measure	Title	Description	Type of Measure[1]	U.S. Army Corps of Engineers AWS Project Number [2]
HCM 3-04Q	Seasonal Protection of Northern Goshawk Nests	Tacoma will not fell timber, yard timber or construct roads within 0.25 mile, apply aerial pesticides within 0.5 mile, or blast within 1.0 mile of any known active northern goshawk nest from 1 March through 31 August	Type 3	N.A.
HCM 3-04R	Long-Term Protection of Northern Goshawk Nests	Tacoma will not fell timber or otherwise alter habitat within 660 feet of any known active northern goshawk nest in the Upper HCP Area	Type 3	N.A.
HCM 3-04S	Pileated Woodpecker Nest, Roost, and Foraging Trees	Tacoma will give preference to leaving green recruitment trees with visible signs of pileated woodpecker nesting, roosting, and/or foraging when selecting snags and trees to meet other HCMs	Type 3	N.A.
HCM 3-04T	Vaux's Swift Nest and Roost Trees	Tacoma will give preference to leaving green recruitment trees with visible signs of current Vaux's swift nesting and/or roosting and those with the potential for future use when selecting snags and trees to meet other HCMs	Type 3	N.A.
HCM 3-04U	Larch Mountain Salamander Habitat Protection	Tacoma will not harvest timber, yard timber, construct roads, or apply aerial pesticides, herbicides, or fertilizers within forested talus fields larger than 1.0 acres, and within 100 feet of unforested talus fields of 0.5 acre or more in size and will abandon all existing roads through unforested talus fields of 0.5 acre or more in size	Type 3	N.A.
HCM 3-04V	Sightings of Covered Species	Tacoma will notify the USFWS in a timely manner of any reported sightings of a spotted owl, marbled murrelet, grizzly bear, gray wolf, Pacific fisher, California wolverine, or Canada lynx in the Upper HCP Area	Type 3	N.A.

Table 5-1. Tacoma Water (Tacoma) habitat conservation measures (HCM) to be implemented under the HCP.

Habitat Conservation Measure	Title	Description	Type of Measure[1]	U.S. Army Corps of Engineers AWS Project Number [2]
HCM 3-04W	Seasonal Protection of Occupied marbled Murrelet Nesting Habitat	Tacoma will not fell timber, yard timber, or construct roads within 0.25 mile, apply aerial pesticides within 0.5 miles, or blast within 1.0 mile of suitable marbled murrelet nesting habitat where "occupancy" has been determined or "presence" has been observed but occupancy is undetermined from 1 April through 15 September.	Type 3	N.A.
HCM 3-04X	Site-Specific Protection for Northwestern Pond Turtles	Tacoma, the WDFW, and the Services will cooperatively develop site-specific protection plans for Northwestern pond turtles if the turtles are found to occur on or near the Covered Lands and it is determined the Covered Activities have the potential to impact the turtles.	Type 3	N.A.

[1] Type 1: Protection measure designed to offset impacts of a Tacoma water withdrawal activity.
Type 2: Protection measure designed to offset impacts of a non-Tacoma activity.
Type 3: Protection measures designed to offset impacts of a Tacoma non-water withdrawal activity.

[2] **Project numbers refer to mitigation and restoration measures identified in the Draft Environmental Impact Statement (DEIS) for the Additional Water Storage Project (USACE 1998). Note that during further development of the measures, site designations may change from those identified in the DEIS.**

AWSP	Howard Hanson Dam – Additional Water Storage Project	MS	Mainstem; refers to AWS projects located in the mainstem Green River
FDWRC	First Diversion Water Right Claim	NA	Not Applicable
FP	Fish Passage; refers to an AWS fish passage project	SDWR	Second Diversion Water Right
		TPU	Tacoma Public Utilities
HCM	Habitat Conservation Measure	TR	Tributary; refers to AWS projects located in Green River tributaries
HCP	Habitat Conservation Plan		
HHD	Howard Hanson Dam	USFS	United States Forest Service
ITP	Incidental Take Permit	USFWS	United States Fish and Wildlife Service
LMS	Lower Mainstem; refers to AWS projects located in the mainstem Green River below HHD	VF	Valley Floor; refers to AWS projects located in the Green River valley floor
		WAU	Watershed Administrative Unit
LWD	Large Woody Debris	WFPB	Washington Forest Practices Board
MIT	Muckleshoot Indian Tribe		

Many of the conservation measures described in this chapter have been developed to protect or enhance aquatic, wetland, or upland habitats or to address ecosystem functions such as sediment transport. These measures often benefit many of the species for which Tacoma is seeking coverage under the ITP. For example, maintenance of minimum flows in the middle and lower Green River, while designed to benefit various salmon species covered by the ITP, would also directly benefit other fish, wildlife, and riparian plant communities. Other conservation measures were developed to address habitat or management issues specific to a species, such as **protecting active dens** ~~preventing contractors in the upper watershed from carrying firearms to avoid the incidental shooting~~ of grizzly bears**, Canada lynx and gray wolf**. Where a species is not addressed by a specific conservation measure, general habitat conservation measures were considered to provide adequate protection.

This chapter describes each of the habitat conservation measures and is presented by the "type" of measure as previously described in this subsection. The order of presentation begins with Type 1 measures and extends through Type 3. The primary description of Tacoma's commitment for each measure is contained within textboxes (text outlined by solid black line) located at the beginning of each subsection. Following the textbox, the objective, rationale for implementation of the measure, and the anticipated ecological benefits are presented for each conservation measure. Costs for implementation of the conservation measures are contained in Chapter 8. Each measure has been given an identification number consisting of the letters HCM (Habitat Conservation Measure) followed by a two-digit number (e.g., HCM – XX)

~~This chapter describes each of the habitat conservation measures with reference to the different "types" noted above, the rationale for implementation of the measure, and the anticipated ecological benefits. Costs for implementation of the conservation measures are contained in Chapter 8. Each measure has been given an identification number consisting of the letters HCM (Habitat Conservation Measure) followed by a two-digit number (e.g., HCM – XX). The order of presentation begins with Type 1 measures and extends through Type 3.~~

5.1 Habitat Conservation Measures – Type 1

Type 1 habitat conservation measures are those designed to offset or compensate for impacts resulting from Tacoma water withdrawal activities. For instance, as part of the MIT/TPU Agreement, Tacoma agreed to design, construct, and operate an upstream fish passage facility at its Headworks, the Green River municipal and industrial water supply intake located at RM 61.0. The upstream fish passage facility was one of several measures that were developed as part of the MIT/TPU Agreement that settles Muckleshoot claims against Tacoma, including the FDWRC and the SDWR, arising out

of Tacoma's municipal water supply operations on the Green River. Selected excerpts of the 1995 MIT/TPU Agreement are provided in Appendix B.

5.1.1 Habitat Conservation Measure: HCM 1-01 ~~Minimum~~ FDWRC Instream Flow Commitment ~~Under FDWRC~~

HABITAT CONSERVATION MEASURE NUMBER: HCM 1-01

MEASURE: ~~Minimum~~ FDWRC Instream Flow Commitment ~~Under FDWRC~~

Tacoma will **constrain water withdrawals under the FDWRC to provide guaranteed minimum continuous instream flows** ~~provide for the following minimum instream continuous flows (minimum flow)~~ **(during the period 15 July to 15 September)** at the Auburn, Washington gage (USGS Gage # 12113000) as defined for different summer weather conditions:

Summer Weather Condition	Auburn Instream Flow
Wet Years	350 cfs
Wet to Average Years	300 cfs
Average to Dry Years	250 cfs
Drought Years	250 to 225 cfs, depending on the severity of the drought

Wet, average, dry, and drought weather conditions will be determined by the use of reference zones within Howard Hanson Reservoir that show available storage by date **within the 24,200 acre-foot block of water stored for flow augmentation purposes** (Figure 5-1). Tacoma will have the option to lower the ~~minimum~~ flow requirement to 225 cfs at the Auburn gage during drought conditions. At that time, Tacoma may rely on the South Tacoma well field or other groundwater sources to meet its water supply need, and reduce water withdrawals under the FDWRC. Tacoma may also utilize the South Tacoma well field or other groundwater sources if the USACE augments releases from HHD to meet a 225 cfs flow at Auburn during the summer months and if fall precipitation does not occur in sufficient quantities to meet minimum flows at Palmer. Tacoma will reduce its withdrawal to help prevent a premature drawdown of the reservoir by the USACE. However, thirty days prior to any reduction, Tacoma will convene a drought coordination meeting with the MIT, local, state and federal resource agencies, and USACE to discuss alternatives and seek to institute "consensus derived" water use restrictions. Before lowering the minimum flow in the Green River, Tacoma will institute water use restrictions consistent with an existing water use curtailment plan. ~~At no time will the minimum flow be allowed to drop below 225 cfs at Auburn. The instream flows specified above are supplemental to the instream flow target of 110 cfs at the Palmer U.S. Geological Survey (USGS) Gage 12-106700, as provided by Tacoma and the USACE.~~

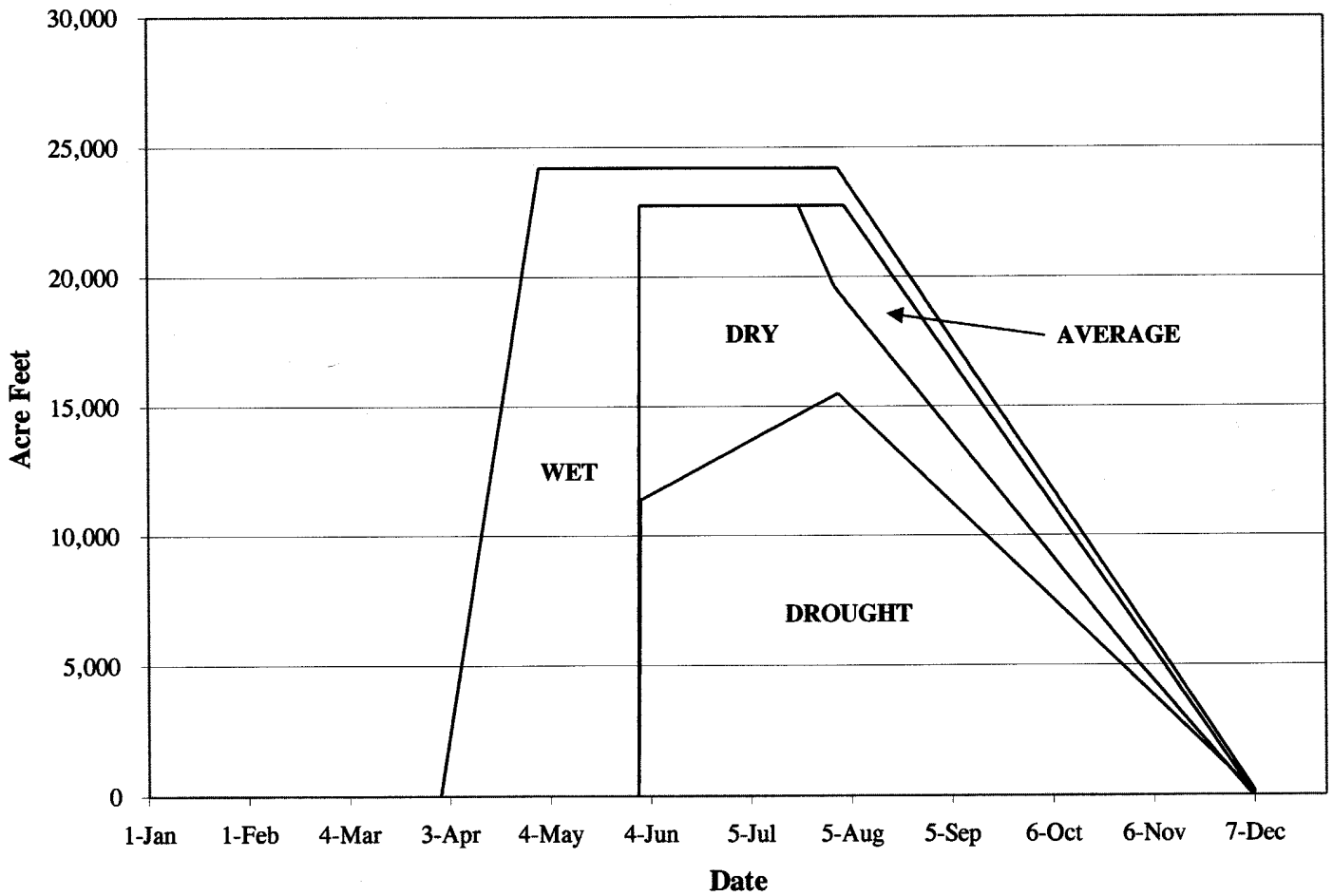

Figure 5-1. Storage reference zones within Howard Hanson Reservoir used to determine minimum flow conditions under yearly wet, average, dry and drought conditions during the period 15 July to 15 September. The storage reference zones pertain to the 24,200 acre-foot block of water stored for flow augmentation purposes.

During the summer period, the instream flow will be maintained above 225 cfs at the Auburn gage even during drought conditions. These commitments by Tacoma are contingent upon

- **continued dedication of 24,200 acre-feet of water stored in Howard Hanson Reservoir for low-flow augmentation to maintain a minimum flow of 110 cfs measured at the USGS Palmer Gage; and**
- **at least 2,500 acre-feet of the 5,000 acre-feet of storage authorized by the Section 1135 project for flow supplementation shall be used to support minimum instream flows during drought conditions.**

Should resource agency decisions on the use of water stored behind Howard Hanson Dam for flow augmentation purposes deviate from these contingencies and thereby limit Tacoma's ability to meet its flow commitment under HCM 1-01, then Tacoma shall be temporarily relieved of its commitment to the extent of the deviation from the contingencies described above.

Tacoma began withdrawing water from the Green River for municipal water supply in 1911 at their Headworks facility at RM 61.0. In 1971, a water right claim of 400 cfs was filed for this diversion (Ecology 1995). Under current conditions, Tacoma withdraws up to 113 cfs under their First Diversion Water Right claim (FDWRC). A water right claim on file with the Washington State of Ecology cannot be validated until an adjudication occurs. As part of HCM 1-01, Tacoma will not pursue adjudication of the full 400 cfs, but will cap their First Diversion Water Right claim at 113 cfs.

Tacoma's FDWRC instream flow commitment is to support flow levels measured at the USGS gage at Auburn. The FDWRC is not constrained by minimum flows prescribed by Ecology for the Green River in the Washington Administrative Code (WAC) 173-509 at either the Palmer or Auburn USGS gages.

North Fork Well Field

In view of potential impacts to instream resources in the North Fork, Tacoma will restrict use of the North Fork well field to periods when the turbidity of Green River surface water supplies approach 5 NTUs, unless emergency conditions require use of the North Fork aquifer in lieu of surface water. This restriction does not apply to occasional pumping of the well field to supply domestic water to Tacoma operations staff living on-site. During the period July 1 through October 31, should turbidity of the mainstem Green River approach 5 NTUs, Tacoma will begin pumping from the North Fork well field at a rate that maintains a maximum pumping-related stage drop of no greater than one inch per hour in the lower North Fork channel at an area of potential salmonid holding refugia to be determined in coordination with the NMFS and USFWS. As the well field is brought on-line, Tacoma will use in-line storage or groundwater supplies in the vicinity of Tacoma (e.g., South Tacoma well field), to meet municipal water demand.

Tacoma will conduct a study to identify the physical effect of the rate of well field pumping on stage changes in the lower North Fork channel in consultation with the NMFS and USFWS within two years following signing of the ITP. The study must be

designed and completed in coordination with the NMFS and USFWS and submitted to the Muckleshoot Indian Tribe and local, state and other federal resource agencies for review and comment. The results of the study will be used to identify a maximum rate of pumping that maintains a pumping-related stage reduction of no greater than one inch per hour in selected adult salmonid refuge area within the lower North Fork channel as determined by the NMFS and USFWS.

Restrictions on the use of the North Fork well field will be subordinate to Tacoma's responsibility to comply with Safe Drinking Water Act Maximum Contaminant Level Limits. In the event that **such emergency** conditions were to occur**,** ~~that are currently unforeseeable,~~ Tacoma agrees to take every effort to avoid actions which would be detrimental to the North Fork Green River's natural resources as the City meets its responsibility to maintain water quality and protect public health. In the event of an ~~unforeseen~~ emergency, Tacoma will consult with the USFWS and NMFS to determine a course of action that will minimize impacts to North Fork fisheries.

Objective

The objective of this measure is to implement guaranteed **continuous** ~~minimum~~ instream flows in the Green River below Tacoma's Headworks to protect important fisheries habitats as specified in an agreement between the Muckleshoot Indian Tribe and Tacoma.

Rationale and Ecosystem Benefits

Instream flows that provide for important fish habitats are fundamental to the long-term protection and propagation of fishery resources in the Green River. Since November 1906, there has been a large decrease in instream flows of the lower Green River. This has resulted from a combination of developments, including but not limited to the diversion (in 1906) of the White River into the Puyallup River (causing a loss of approximately 50 percent of the inflow to the Green/Duwamish estuary), the diversion (in 1912) of the Cedar River into Lake Washington (the Cedar historically flowed into the Black River, which flowed into the Green), and the construction and operation of Tacoma's Headworks diversion (completed in 1913) near Palmer, Washington (see Chapter 4). Overall, 70 percent of the flows of its former watershed have been diverted out of the Green River basin.

From 1911 to 1947, Tacoma diverted up to 85 cubic feet per second (cfs) of water from the Green River at the Headworks under the FDWRC. Since 1948, Tacoma has diverted up to 113 cfs from the Green River under the FDWRC. The combined effects of these actions often resulted in seasonal depletions in instream flows that were detrimental to existing fish populations. The construction and regulation of HHD and reservoir in 1962 afforded some flow protection to downstream fish habitats by providing storage of water

for low flow augmentation to meet a minimum flow target of 110 cfs measured at the USGS gage at Palmer located below Tacoma's Headworks. The instream flow at Palmer may drop below 110 cfs if the inflow to HHD is below 110 cfs and there is insufficient storage to augment flows (e.g., during winter flood control season).

Observation by state and tribal biologists indicated that flows of 110 cfs at Palmer were barely sufficient to provide for passage of adult salmon in the lower river during low flow years and were sometimes insufficient to keep steelhead eggs watered. In 1988, the Washington Department of Ecology (Ecology) completed an instream flow study (using the U.S. Fish and Wildlife Service [USFWS] Physical Habitat Simulation [PHABSIM] methodology [see Chapter 7]) that identified and recommended much higher instream flows (Caldwell and Hirschey 1989).

The guaranteed ~~minimum instream~~ flow~~s~~ **levels** at Auburn specified in this conservation measure were developed as a result of an agreement between MIT and Tacoma**.** ~~and are even higher than those recommended by Ecology.~~ The flows specified in the MIT/TPU Agreement are designed to protect important fishery habitats below Tacoma's Headworks consistent with annual differences in precipitation and flow availability. Because of timing, the ecological benefits of such flows would include improvements in both habitat quantity and quality. With respect to quantity, the flows would provide for a variety of important and seasonally specific life history stage requirements (see Appendix A), including adult salmon holding and spawning habitat, incubation and emergence of steelhead eggs and fry, and upstream passage of adult salmon (see Chapter 7). The flows would also increase the amount of available freshwater habitat in the Green/Duwamish estuary during the summer extreme low flow periods. Benefits related to habitat quality would likely include reductions in water temperatures during the summer months immediately below HHD, increases in or maintenance of dissolved oxygen (DO) levels, and the potential dilution of nutrients and introduced pollutants in the lower Green River. ~~Maintenance of minimum flows will provide a level of resource protection but~~ **Tacoma's commitment to maintain flows during the period 15 July to 15 September will provide a guaranteed level of resource protection. However, this flow commitment** will not provide the full range of flow variability needed to satisfy ecosystem functions. Flow variations, to the extent allowed within the operation**al constraints** of HHD, are provided by other habitat conservation measures.

Tacoma has long encouraged customers to use water efficiently, but increased its focus on conservation during the summer of 1987 when a drought in Puget Sound drastically reduced river flows in the Green River. The late summer drought that year made it difficult for adult chinook salmon to swim upstream to spawn. To facilitate the salmon's

upstream migration, Tacoma reduced the amount of water it withdrew from the river and instituted voluntary and mandated water use restrictions. The less water people use, the more water is available for fish in the Green River. Conservation is especially important in the summer when river flows are at their lowest and water use is at its highest. Tacoma continues to invest considerable resources to educate its customers about the importance of conserving water (see Appendix C, Water Conservation Planning).

North Fork Well Field

Tacoma withdraws water from the North Fork well field to replace or supplement surface water withdrawn from the Green River at the RM 61.5 Headworks. When the turbidity of Green River surface water supplies approach 5 NTUs, the North Fork well field provides a source of clean groundwater that allows Tacoma to provide the public with water that meets rigorous federal and state water quality standards. In general, pumping from the North Fork well field occurs during the late fall, winter and spring when turbidity increases as a result of storm events and resultant periods of high streamflow.

Tacoma's use of the North Fork well field may pose the greatest risk to instream resources during the late summer and early fall. If pumping from the well field was to occur without a storm-related rise in streamflow, adult salmonids holding in the lower North Fork channel could be exposed to channel dewatering. Groundwater outflow below the well field maintains cool water temperatures and provides potentially important adult holding and rearing habitat for salmonids. If pumping from the North Fork well field during the late summer interrupts the outflow of groundwater and reduces flow into the channel; fish holding in the lower North Fork could be trapped in isolated pools or be forced to move downstream to the reservoir.

Restricting withdrawals from the North Fork well field to periods when the turbidity of the mainstem Green River approaches 5 NTUs reduces the risk of impact to instream resources in the lower North Fork to those periods when water withdrawals are needed to avoid violation of Primary Drinking Water Standards. Restricting the pumping of water from the North Fork well field to a rate that maintains a pumping-related stage reduction of no greater than one inch per hour in the lower North Fork channel during the period July 1 though October 31 helps ensure that fish holding in the lower North Fork channel will have the opportunity to move downstream to the reservoir and potentially avoid becoming stranded by pumping-related reductions in stage.

5.1.2 Habitat Conservation Measure: HCM 1-02 Seasonal Restrictions on the Second Diversion Water Right

HABITAT CONSERVATION MEASURE NUMBER: HCM 1-02

MEASURE: Seasonal Restrictions on the Second Diversion Water Right

Before withdrawing water under the SDWR **at an instantaneous rate not to exceed 100 cfs**, Tacoma will **adhere to** ~~meet~~ the following seasonal minimum flows at the Palmer, Washington gage (USGS # 12106700) and Auburn, Washington gage (USGS #12113000):

INSTREAM FLOW BY SEASON REQUIRED FOR SDWR WITHDRAWAL

Season by Dates	Palmer	Auburn
15 July to 15 September	200 cfs	400 cfs
16 September to 31 October	300 cfs	**NA**
~~1 November to 14 July~~	~~300 cfs~~	

NA - Not applicable – The SDWR is not constrained by minimum instream flows in the Green River measured at the USGS gage at Auburn during the period 16 September to 14 July.

These instream flow conditions are in addition to those specified under HCM 1-01 and specify the flow conditions under which **the** SDWR **can be exercised** ~~water can be diverted into P5~~. Both instream flow conditions must be met before SDWR water can be diverted. Thus, if instream flows at Auburn fall below 400 cfs, even if minimum flows for the Palmer gage are achieved, Tacoma may not withdraw water using its SDWR. ~~To the extent that these instream flow requirements are greater than the instream flows prescribed by Ecology (e.g., July through October), these flow requirements will control the diversion action.~~ **Tacoma's exercise of its SDWR will be constrained by the minimum flow requirements identified in this Habitat Conservation Measure or by minimum flows prescribed by Ecology in WAC 173-509, whichever are greater. Tacoma will also work with Ecology to modify minimum flow requirements for the Green River prescribed by Ecology in the WAC to be consistent with the flow commitments identified in this HCP.**

Tacoma's ability to divert its SDWR from the Green River is restricted by the City's 1995 agreement with the Muckleshoot Indian Tribe. That agreement establishes minimum instream flows at both the Palmer and Auburn gauges on the Green River. When flows at either gauge are below the minimum flow levels stated above Tacoma cannot divert water under its SDWR.

Tacoma intends to divert its SDWR to storage behind HHD under the Additional Water Storage Project (AWSP) between February 15 and the point when either 20,000 acre feet have been stored, or when stream flows reach the thresholds specified above. When Green River flows are below the flow thresholds, and Tacoma cannot divert water under its SDWR, the stored water would be used for municipal supply.

Objective

The objective of this measure is to set controls on the withdrawal of Tacoma's SDWR to further ensure protection of fisheries habitat in the Green River.

Rationale and Ecosystem Benefits

This conservation measure is likewise focused on providing instream flows in the lower Green River that promote a healthy instream ecosystem. The measure is complementary to HCM 01 and focuses on seasonal (summer) flow requirements to maintain important fish habitats in the river.

This measure essentially controls when Tacoma will be able to exercise its SDWR. That is, **during the summer period (15 July to 15 September)** both the Palmer and Auburn instream flow requirements noted above must be met before Tacoma can withdraw ~~any~~ water **directly from the Green River under its SDWR.** ~~into P5.~~ **Water stored for municipal supply behind HHD under the AWS project can be used at any time since it represents a prior exercise of the SDWR.** Operationally, as flows in the lower Green River begin to decrease during the late spring and early summer, Tacoma will begin reducing the amount of water it diverts under the SDWR by the amount necessary to meet the specified instream flow requirements. This reduction in diverted flow would continue until the SDWR becomes non-operational (i.e., no water is being diverted), at which time the instream flow conditions specified in HCM 01 would dictate the minimum flows in the lower Green River. **When low instream flows in the Green River prevent Tacoma from exercising its SDWR and withdrawing water directly from the river, Tacoma will use water stored behind HHD for municipal use to meet the demands of its water supply customers.**

The instream flow values specified **in this HCM for the USGS gage at Palmer** ~~for 1 November to 14 July~~ are **equal to or higher than those** ~~the same as those~~ set by Ecology as part of its Instream Resource Protection Program (IRPP) (Chapter 173-509 WAC). ~~During the summer and early fall, the instream flow values under the MIT/TPU Agreement are higher than Ecology's instream flows:~~

Instream Flow Requirements at the USGS gage at Palmer (USGS #12106700) under the **1995** MIT/TPU Agreement and Ecology's Instream Resource Protection Program ~~for a normal water year~~.

Season	MIT/TPU	Ecology **(WAC 173-509**	
		Normal Year	**Critical Year**
15 July to 15 September	200 cfs	150 cfs	**150 cfs**
16 September to 30 September	300 cfs	150 cfs	**150 cfs**
1 October to 15 October	300 cfs	190 cfs	**150 cfs**
16 October to 31 October	300 cfs	240 cfs	**150 cfs**
1 November to 14 July	300 cfs	300 cfs	**150 cfs**
1 November to 15 November	**300 cfs**	**300 cfs**	**190 cfs**
16 November to 30 November	**300 cfs**	**300 cfs**	**240 cfs**
1 December to 14 July	**300 cfs**	**300 cfs**	**300 cfs**

During the period 15 July to 15 September, as a result of the 1995 MIT/TPU Agreement, Tacoma's exercise of its SDWR will also be constrained by minimum flows measured at the USGS gage at Auburn. During the period 15 July to 15 September, Tacoma will not be able to withdraw water directly from the Green River under its SDWR if instream flows drop below 400 cfs measured at the USGS gage at Auburn. This minimum flow is greater than the 300 cfs instream flow requirement identified in the WAC 173-509 for the USGS gage at Auburn during the period 15 July to 15 September. Tacoma's exercise of its SDWR will be constrained by minimum flow requirements identified in HCM 1-02, or by minimum flows prescribed by Ecology in WAC 173-509 for the USGS gage at Palmer, whichever is greater. Except for the commitment in this HCP to constrain its exercise of the SDWR during the period 15 July to 15 September by a minimum flow of 400 cfs measured at the USGS gage at Auburn, Tacoma's SDWR is not constrained by minimum instream flows identified in WAC 173-509 for the Green River at Auburn.

The flows for the period 15 July-15 September approximate those identified as providing peak adult chinook holding, and juvenile chinook, coho, and steelhead rearing habitats in the section of river below the Headworks (Caldwell and Hirschey 1989). The flows specified for Auburn (i.e., 400 cfs) for the same time period (15 July-15 September) likewise protect adult chinook and steelhead holding, and steelhead juvenile habitats. The flows are even greater than those identified as providing peak chinook and coho juvenile habitats (400 cfs vs 220 cfs) (Caldwell and Hirschey 1989). The specified instream flows would protect the habitats in the Green River during the period of time when Tacoma exercises their SDWR. Anticipated benefits include improved, but still only partial protection of steelhead egg incubation and fry emergence, increased juvenile rearing habitats, increased early summer holding habitats for adults and juvenile fish, and increased attraction flows to facilitate adult returns to the river. As in HCM 01, benefits would include those related to water quality improvements, as well as benefits for wildlife and riparian ecosystems.

5.1.3 Habitat Conservation Measure: HCM 1-03 Tacoma Headworks Upstream Fish Passage Facility

HABITAT CONSERVATION MEASURE NUMBER: HCM 1-03

MEASURE: Tacoma Headworks Upstream Fish Passage Facility

Tacoma will modify the existing Headworks facility by increasing the height 6.5 feet and by adding an adult **upstream fish passage facility** ~~fish ladder leading to a trap and holding facility~~. **The proposed facility includes a fish ladder over the Tacoma Headworks combined with a trap-and-haul operation to pass adult fish from the Headworks to above HHD.** In addition, the channel downstream of the diversion dam will be reshaped to provide greater fish attraction to the ladder entrance **(Merry 1995)**. An alternative location for the upstream fish passage facility may also be considered. Any alternative location must satisfy the objective of providing anadromous fish access to the Green River above HHD and must be developed in coordination with the MIT, USACE, WDFW, and the Services. ~~The fish collection facility, consisting of a ladder and holding facilities, will provide for passage of adult steelhead and salmon around HHD (Merry 1995).~~ Adult fish will be transported using a truck specially outfitted to minimize handling and transport stress. Details and final design of this facility will be developed in close coordination and collaboration with MIT, USFWS, USACE, the National Marine Fisheries Service (NMFS), Washington State Department of Fish and Wildlife (WDFW), and other interested parties.

Funding the construction and operation of the upstream fish passage facility is evidence of Tacoma's commitment to long-term measures to help restore anadromous fish production above the USACE's HHD. Once upstream fish passage facilities are completed, the agencies and Tribes with jurisdiction for fisheries management will determine the number and species of fish to be transported into the upper watershed. Determining how many, and which species of fish, should be considered for re-introduction to the upper watershed is a fish management decision that is beyond the responsibility of Tacoma. The MIT and WDFW are co-managers of Green River fish and wildlife resources and together with the NMFS and USFWS will evaluate fisheries aspects of re-introducing anadromous fish into the upper watershed.

Tacoma does not believe re-introduction of anadromous fish to the upper watershed poses a risk to drinking water quality and public health at the numbers, which have been discussed to date. This would include the introduction of up to 6,500 adult coho and 2,300 adult chinook. This level would be reached over a period of years allowing adequate opportunities to assess water quality on an ongoing basis. Tacoma will monitor the effects of fish passage on drinking water quality as part of their surface water treatment operations (see Subsection 6.1.4). If continued monitoring confirms that re-introduction of anadromous fish does not pose a risk to public health, no further action will be taken. If, to adequately protect drinking water quality, it becomes necessary to limit the biomass of adult fish transported into the upper

watershed, Tacoma will coordinate with the NMFS, USFWS, and the fisheries managers before instituting measures to decrease fish passage. As part of the coordination effort, Tacoma will select one or more independent experts to evaluate available options. The independent expert will submit a report to the City, fisheries managers, and public health officials with recommendations as to the level of fish passage that can occur without posing a risk to drinking water quality and public health.

Objective

The objective of this measure is to construct and operate facilities for the upstream movement of adult anadromous fish as part of an overall program to provide anadromous fish access to the Green River above HHD.

Rationale and Ecosystem Benefits

In 1913, construction of Tacoma's Headworks Diversion Dam at RM 61.0 was completed 3.5 miles downstream of the eventual site of HHD. This facility was the first complete barrier to adult salmon and steelhead in the Green River, and eliminated anadromous fish production in the upper watershed. The completion of HHD in 1962 created a further barrier to upstream passage and served to essentially isolate approximately 220 square miles of watershed area (45 percent of the entire Green River basin). Most of the headwater streams in the upper watershed are unconstrained by levees or dikes. Thus, **a portion of the upper watershed** ~~they~~ contains ~~substantial~~ anadromous fish habitat that could be restored to production using an adult passage/trap-and-haul facility at the Headworks. Since 1992, MIT, Tacoma, WDFW, and Trout Unlimited have cooperatively administered a temporary fish ladder and trap-and-haul program. As a pilot program, between 7 and 133 adult steelhead have been captured at the Headworks fish trap and either released above HHD for natural spawning or used as broodstock to produce fry for outplanting in the upper Green River watershed.

Under the proposed measure, adult fish will be collected downstream of the Tacoma Headworks at RM 61.0 and released at the upstream extent of the HHD reservoir in the vicinity of RM 72.0. Upstream migrating adult salmonids could be released into the reach between the Headworks and HHD if deemed beneficial by MIT and WDFW in coordination with the Services. The proposed facility includes a fish ladder over the Tacoma Headworks combined with a trap-and-haul operation from the Headworks to above HHD. The proposed measure was selected in favor of other passage alternatives for several reasons. Although the proposed fish ladder has the physical capability to allow fish to be released immediately above the Headworks, this would only open up 3.5 miles of the mainstem Green River. This area consists of a high-energy confined

channel. Such channels typically route most gravel-size sediment rapidly through the reach, unless there are stable LWD or other obstruction present that form hydraulically protected areas (Paustain et al. 1992). Since the majority of primary spawning and rearing habitats are above HHD, a second upstream fish passage facility consisting of either a very long fish ladder or a trap-and-haul facility would also need to be constructed at HHD to achieve similar benefits to the proposed measure.

Construction of a fish ladder at the Tacoma Headworks combined with a trap-and-haul facility at the HHD would impose higher stress and increased migration delays to upstream migrants than the proposed measure. Adult fish would need to locate and enter a second fishway leading to a trap-and-sorting facility at HHD. Given the configuration of the river and outlet works at HHD, it is likely that a second upstream fish passage facility would need to be located well downstream of HHD; thus further reducing any benefits of allowing salmonids access to the reach between the Headworks and HHD.

There are serious concerns regarding the applicability of conventional fish ladder technology to HHD. The overall height of the Howard Hanson Dam (235-feet) would require a ladder with a length of at least one-mile. Fish attempting to ascend a ladder of this length and height would be exposed to stress and potential water quality deterioration. ~~Tacoma is not aware of any fish ladders constructed to provide adult salmonid fish passage on dams of this height.~~

Another limitation to installing a fish ladder at HHD is the large fluctuation in the reservoir level. Since HHD provides a major flood control function, the water level behind the dam can vary by more than 150 feet during times when adult salmon and steelhead are migrating upstream. During times when the water level is low, the fish that ascended the 235 foot high ladder would then need to be lowered (as much as 150 feet) to the level of the reservoir pool behind the dam. This would require that the adults either be returned in a high velocity slide/chute to the pool level or via some type of mechanical elevator. In either case, the fish would experience additional stress associated with the passage facilities. As an alternative to returning the fish to the lower pool level, the fishway could be extended upstream of the reservoir. However, this would entail extending the fishway approximately 7 miles upstream of the dam, which raises a number of additional concerns about whether effective passage could be achieved (**given concerns about** water temperature and habitat conditions within the fishway). **Tacoma is not aware of any fish ladders constructed to provide adult salmonid passage on dams with the height and range of forebay fluctuation as found at HHD.**

The proposed fish passage facility includes a fish ladder over the Tacoma Headworks combined with a trap-and-haul operation from the Headworks to above HHD. Estimated capital costs for entire facility are $2.53 million. Approximately 63 percent of this $2.53 million is needed for the trap, sorting, and hauling facilities **associated with the transport of adult fish above HHD**. Once constructed, operational costs for the Green River fish ladder would be minimal. In comparison, annual operational costs of transporting adult salmonids via truck are not inconsequential. The proposed measure not only affords passage above the Headworks, but also provides passage around ~~the USACE~~ HHD without imposing additional delays and stress to the fish.

Tacoma supports the full utilization of the upper Green River watershed for anadromous fish production, consistent with the continued use of the Green River as a source of drinking water. At this time, the City does not believe re-introduction of anadromous fish to the upper watershed poses a risk to drinking water quality and public health. Most salmon die after spawning, but the carcasses are quickly consumed (Cederholm et al. 1999). In a study of seven streams in the Olympic Peninsula in Washington State, over 90 percent of coho salmon carcasses were not flushed downstream but remained within several hundred yards of the original placement site (Cederholm et al. 1989).

The City of Seattle conducted a risk assessment of potential negative impacts of salmonid passage on safe drinking water as part of their plan to re-introduce adult anadromous salmonids into the upper Cedar River. The City of Seattle determined that while passage of mass-spawning sockeye over their intake would compromise drinking water quality and public health, passage of much less numerous coho, chinook, and steelhead into the Cedar River above their intake was unlikely to present drinking water problems (Manning et al. 1996). There are numerous similarities and several important differences between the two plans to re-introduce salmonids above the respective intakes.

The Cedar River watershed is adjacent to the Green River watershed and both flow westerly into Puget Sound. Plans to re-introduce salmonids into the upper watersheds of both the Cedar and Green rivers have targeted re-introduction of coho, chinook, and steelhead. An estimated 4,500 coho and 1,000 chinook may return to the Cedar River above Lansburg, while an estimated 6,500 coho and 2,300 chinook may return to spawn in the upper Green River watershed. While the upper Green River watershed may have the potential to support higher numbers of coho and chinook than the upper Cedar River, the upper Green River watershed is 1.7 times larger than the Cedar River watershed above Lansburg. Tacoma presently

has allowed the transport of adult steelhead into the upper Green River watershed since 1992.

Seattle's salmonid re-introduction plan for the Cedar River provides a fish ladder to allow adult fish access to the Cedar River immediately upstream of the Lansburg Diversion (City of Seattle 1998). Due to the presence of the USACE's 235-ft high HHD above Tacoma's Headworks, the Green River salmonid re-introduction plan provides for a trap-and-haul facility to move fish past both Tacoma's Headworks and HHD. The reservoir behind HHD and nearly three miles of river between HHD and Tacoma's water intake will allow the natural uptake of nutrients from spawned salmon prior to withdrawal of water for municipal water supply purposes. The reservoir behind HHD and the stream reach between HHD and Tacoma's water intake will also minimize the occurrence of adult salmon immediately upstream of Tacoma's intake. Tacoma will monitor water quality at their Headworks as part of their surface water treatment program to verify safety of the upper Green River as a source of safe drinking water (see Chapter 6.

Construction and operation of a new fish ladder and trap-and-haul facility at the Headworks is instrumental to the restoration of anadromous fish runs into the upper Green River basin, but would represent only a part of the required actions needed to restore anadromy to the upper watershed.

5.1.4 Habitat Conservation Measure: HCM 1-04 Tacoma Headworks Downstream Fish Bypass Facility

HABITAT CONSERVATION MEASURE NUMBER: HCM 1-04

MEASURE: Tacoma Headworks Downstream Fish Bypass Facility

Tacoma will modify the existing Headworks diversion to eliminate the potential that fish could enter the Headworks intake (to be constructed), and to safely bypass them downstream below the diversion. The new Headworks structure will incorporate a non-revolving wedgewire screen with dimensions of approximately 220 feet long, 40 feet wide, and 24 feet deep (see Chapter 4). The intake screen surface will be approximately 120 feet long and 13 feet high (1,300 square feet) (see Chapter 4) and designed to meet State of Washington and NMFS screening criteria (Merry 1995). In addition to the fish screen, the modified facility will consist of a debris/trash rack, fish bypass system, new trashracks, trash raking equipment, stoplogs, and dual slide gates. The modified intake will be 6.5 feet higher than the old intake to compensate for higher water surface elevations resulting from the increase in the diversion dam crest. The screen and bypass system will be operated and maintained continuously whenever water is being diverted into the Headworks. **Debris that collects on the**

trash racks will be returned to the river channel downstream of the Headworks. Tacoma will coordinate with the Services and other agencies with jurisdiction during the design and construction of the Headworks rebuild. In coordination with the Services, Tacoma will rebuild the Headworks to minimize the risk of injury to salmonids passing downstream over the Headworks spillway. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to provide downstream fish passage at Tacoma's Headworks Dam as part of an overall program to provide anadromous fish access to the Green River above HHD.

Rationale and Ecosystem Benefits

Two routes are currently available to juvenile fish migrating downstream below Tacoma's existing Headworks. The first and safest is direct passage over the dam spillway, which is currently 17 feet high**.** ~~and has a crest length of 150 feet.~~ Reconstruction of the Headworks will raise the diversion by 6.5 feet**.** ~~The additional height is not expected to present a risk of injury or mortality to downstream migrants.~~ **Although fish passing downstream over Tacoma's Headworks are believed to incur little injury or mortality during their transit over the existing spillway, some potential for injury does exist. In general, mortality of juvenile fish passing over dams is a function of the height of the structure, the maximum velocity of water (which is primarily dependent on dam height) and the configuration of the channel immediately downstream of the dam. For small fish (< 100 mm), mortality is near zero, even for falls of approximately 100 feet, provided they land in water. Larger fish (> 300 mm) begin to experience mortality at falls greater than 50 feet (R2 1998). Fish mortality is also influenced by the maximum velocity of the flow passing over a dam. Where flows passing over a dam empty into a deep pool or stilling basin, mortality is essentially zero at velocities less than 40 feet per second (fps); however, shallow flow or obstructions such as exposed rocks below the spillway appear to increase the rate of mortality and injury (R2 1998).**

Although there are no site-specific data on the hydraulic conditions or injury or mortality of fish at the existing Tacoma Headworks diversion dam, information from studies at other projects suggest that the rate of mortality experienced by juvenile fish passing over a 17-foot spillway is probably low. Fish passing through the radial gates at HHD drop 26 feet onto a concrete slab with little apparent injury (Seiler and Neuhauser 1985). However, because the channel configuration downstream of the Headworks diversion dam currently consists of a shallow

concrete apron, it must be assumed that there could be some injury or mortality of juvenile and adult salmonids passing downstream over the Tacoma Headworks under its current configuration at some flows.

Reconstruction of the Headworks as part of the Second Supply Project will raise the diversion by 6.5 to a total height of 23.5 feet. As part of conservation measures HCM 1-03, Tacoma Headworks Upstream Fish Passage Facility and HCM 1-04, Tacoma Headworks Downstream Fish Bypass facility, Tacoma will rebuild its Headworks facility and reconfigure the channel below the Headworks to minimize potential injury associated with downstream passage of salmonids over the Headworks spillway.

The second **avenue of downstream passage** is via the Headworks intake. This intake is 20 feet wide and is located in the right abutment (looking downstream) immediately upstream of the existing diversion dam. Approximately 10 percent of the flow in the Green River during the juvenile chinook outmigration season currently enters Tacoma's Headworks **intake** (calculated assuming 113 cfs withdrawal at the median daily flow 15 March through 16 June). The existing Headworks intake screens do not meet NMFS screen criteria and juvenile salmonids can potentially be entrained or impinged on the intake and killed. The new fish screen and bypass system would be designed to meet federal and state fish protection criteria. This measure therefore represents an important element in the overall restoration of anadromous fish runs into the upper watershed.

5.1.5 Habitat Conservation Measure: HCM 1-05 Tacoma Headworks Large Woody Debris/Rootwad Placement

HABITAT CONSERVATION MEASURE NUMBER: HCM 1-05

MEASURE: Tacoma Headworks Large Woody Debris/Rootwad Placement

Tacoma will place large woody debris (LWD) and rootwads to **improve** ~~provide~~ rearing habitat (for juvenile salmon and trout) within two sections of the inundation pool immediately upstream of the modified Headworks diversion dam. ~~The LWD will consist of fir, hemlock, cedar, or spruce greater than 20 feet long, with a minimum stem diameter of 12 inches. Rootwads will have at least 3 feet of attached stem that is 18 inches in diameter or greater. No more than 18 and no less than six of the debris pieces will be rootwads. Boulders will be placed at the upstream end of the bar at Site 1 to dissipate the energy of high flows sweeping across the bar. In addition, boulders will be incorporated into LWD clusters to provide stability. Boulders will have a minimum diameter of 4 feet and be composed of hard rock.~~ The first site is located near an access road bridge; the site will be flooded to a depth of one to six feet due to

the increase in pool elevation. At this site, approximately 10 boulders and 43 pieces of LWD will be placed within the active channel. The second site is located along the eastern shore of the Green River, near the upper end of the inundation zone. At this site, five pieces of LWD will be cabled along the bank, with each piece individually anchored to boulders to allow some movement at high flows.

The LWD will consist of fir, hemlock, cedar, or spruce greater than 20 feet long, with a minimum stem diameter of 12 inches. Rootwads will have at least 3 feet of attached stem that is 18 inches in diameter or greater. No more than 18 and no less than six of the debris pieces will be rootwads. Boulders will be placed at the upstream end of the bar at Site 1 to dissipate the energy of high flows sweeping across the bar. In addition, boulders will be incorporated into LWD clusters to provide stability. Boulders will have a minimum diameter of 4 feet and be composed of hard rock.

Structures that are deemed non-functional as a result of high flows will be modified or replaced by Tacoma as needed within the first five years following construction (see Chapter 6). Tacoma will also fund one complete replacement within the term of the HCP should deterioration of the materials or flood damage make such an action necessary.

Alternative measures will be implemented if any of the above measures are determined to be infeasible, or not cost-effective during final design, or if environmentally superior measures can be implemented at comparable cost. Any alternate measures will have habitat benefits greater than or equal to the measure originally proposed, and will be reviewed and approved in advance by the NMFS and USFWS. Permits for these projects have already been approved by the USACE, therefore any changes to the existing project designs that may be requested or approved by the Services will also be subject to approval by the USACE.

Objective

The objective of this measure is to improve rearing habitat for juvenile salmonids in the portion of the Green River immediately upstream of Tacoma's Headworks Dam **by increasing cover within the new inundation zone**.

Rationale and Ecosystem Benefits

The Headworks diversion dam will be raised 6.5 feet to accommodate the diversion of the SDWR. Raising the Headworks will inundate an additional 1,800 feet of channel, or approximately 7 acres (FishPro 1995). Currently, the density of LWD within the area upstream of the Headworks is considered low (0.29 pieces per channel width) compared to free-flowing river systems. This is likely due, in part, to the location of HHD 3.5 miles

upstream (which blocks recruitment of LWD from the upper watershed), as well as past logging practices (CH2M Hill et al. 1996a; Fuerstenberg et al. 1996).

Placement of LWD and large boulders in the inundation pool will increase the density of LWD and create additional in-channel rearing habitats. ~~Large woody debris has been shown to be an important element of healthy anadromous salmonid-bearing streams. Functionally, LWD has been shown to: provide cover for juvenile salmonids, serve as media for invertebrate production and certain riparian plant communities, and create velocity breaks that cause localized deposition of sediments, including spawning gravels. Bisson et al. (1987) noted that along with fish habitat formation, LWD is often associated with the control of sediment and organic matter storage, modification of water quality, and the formation of pools.~~ At some time during their rearing periods, all juvenile salmonids prefer areas in the stream where they can find shelter from velocity and predators while remaining close to a food source (Chapman 1966).

Large rivers such as the mainstem Green River easily transport even the largest pieces of LWD. In these channels, wood is characteristically distributed in infrequent jams composed of numerous pieces of wood (Cederholm et al. 1997; Bisson et al. 1987). Because of the high stream power and confined nature of this reach, LWD would be expected to remain stable only along channel margins, oriented parallel or subparallel to the direction of flow.

Site 1 consists of a low terrace that is approximately 650 feet long and 25 to 100 feet wide. This site will be flooded to a depth of one to six feet as a result of the pool raise. Approximately 10 large boulders (diameter ≥ 4 feet) will be placed at the upstream end of the bar to help reduce the erosive energy of high velocity flows sweeping over the bar. Because the channel is wide and has a high transport capacity at Site 1, LWD will be placed in groups to form a series of small, stable jams along the channel margin. Grouping LWD will increase the habitat value and habitat forming function of the relatively small pieces of LWD, in addition to promoting structure stability. Stems will be oriented generally parallel to the flow, with rootwads on the upstream end. Individual pieces of LWD will be cabled to each other and secured to large placed boulders or to stable living conifer trees on the bank. Some movement of the LWD/boulder groups is expected following high flows, as the collections of LWD assume a more natural position. This series of small jams located along the upper channel margin is expected to result in the formation of alcoves and small backwater pools with LWD cover that will provide rearing habitat and refugia for juvenile salmonids at high pool elevations after the diversion dam is raised.

Performance criteria established in the Hydraulic Project Approval (HPA) require that all structures must be able to withstand 100-year peak flows. To this end, Tacoma will also inspect the structures following all flow events with a return interval of 20 years or more as measured at Howard Hanson Dam (see Chapter 6). If the structures fail to meet the stability criteria during the first five years, Tacoma will repair or replace them, modifying the design criteria as necessary in consultation with NMFS and USFWS. After the first five years, Tacoma will provide funding for one additional replacement of the structures, should they decay, or fail following large floods. Should the structures fail more than once during years 6 through 50 of the HCP, habitat benefits of these structures will be reduced.

Site 2 is located at the upper end of the inundation zone. Channel morphology at the site consists of a run/riffle that has formed just downstream of a bar that projects into the flow. The bar creates a relatively protected site where LWD will provide cover and further reduce velocities. Five pieces of LWD will be placed oriented roughly parallel to the flow with rootwads on the upstream end. Each piece of LWD will be loosely cabled to boulder deadmen placed on the bank, allowing the pieces to rise and fall with the flow, and assume a more natural position along the bank. LWD will be placed such that they remain wet during summer low flows. Adding habitat structure at this site is expected to improve rearing habitat at both high and low flows, and to provide a refuge so that fish are not displaced to the inundation pool during high flows.

Tacoma has also pledged to fund two additional habitat rehabilitation projects in the middle Green River; however, these two projects are not included as specific commitments within the HCP. The first of these projects involves providing fish passage to a right-bank off-channel pond (approximately 2 acres in size) at RM 58.5 that is currently disconnected from the mainstem Green River by an inactive beaver dam. The second project involves the rehabilitation of 31 acres of wetland and riparian floodplain at RM 32.9 (Auburn Narrows) consisting of the creation of 5.5 acres of palustrine forest and scrub-shrub wetland, conversion of 1.7 acres of abandoned pasture/emergent wetland habitat to palustrine forested and scrub-shrub wetland habitat, rehabilitation of 2.2 acres of existing wetland habitat, re-establishment of native riparian forest and shrub habitat on 16.4 acres of floodplain, and re-establishment of 5.3 acres of upland forested and shrub plant habitat as riparian buffer. This project may also include development of side channels or beaded ponds that will serve as off-channel habitat suitable for use by rearing salmonids. Tacoma has not included these projects in the HCP because they are located on lands not owned by the City. These projects are part of a cooperative effort with the

USACE and King County, and specific commitments to project objectives and conceptual designs may change prior to implementation. In view of the lack of City control over the land and the uncertainty regarding project objectives, Tacoma has not included them in the HCP. However, Tacoma is still committed to implementing the projects as part of mitigation for the Second Supply Project.

Placement of LWD and boulders in the inundation pool will provide shelter and create important juvenile rearing habitats in that segment of the Green River. Rehabilitation of off-channel habitat elsewhere in the Green River will also increase the amount of juvenile rearing habitat. This habitat conservation measure is expected to benefit downstream migrating juvenile salmonids as well as resident fish. Species benefiting from this measure will include steelhead trout, chinook and coho salmon, cutthroat trout, and resident rainbow trout. These habitat rehabilitation projects have been designed to mitigate for the effects of habitat alteration related to modification of the Headworks.

5.2 Habitat Conservation Measures – Type 2

Type 2 habitat conservation measures are those designed to offset or compensate for impacts resulting from activities carried out by parties other than Tacoma but for which Tacoma is providing a portion of the funding. For instance, construction and operation of HHD for Green River flood control has interrupted the transport of gravel-sized and larger sediments. Construction and operation of HHD is a USACE activity; however, as local sponsor of the AWS project, Tacoma is providing funds to place gravels in the middle Green River channel.

5.2.1 Habitat Conservation Measure: HCM 2-01 Howard Hanson Dam Downstream Fish Passage Facility

HABITAT CONSERVATION MEASURE NUMBER: HCM 2-01

MEASURE: Howard Hanson Dam Downstream Fish Passage Facility

As local sponsor of the AWS project, Tacoma will provide funding support to the USACE to design, construct, and operate a fish passage facility at HHD to increase the survival of salmonids migrating downstream from the upper Green River watershed. Major components of the fish passage facility include a new tower and wet well, a floating fish collector, a fish lock, a discharge conduit, and a fish transport pipeline. The design consists of a combination floating modular incline screen, fish bypass, and single lock facility. The facility will collect fish from 6-20 feet in the water column at all pool elevations (1,070-1,167 feet), and is designed to handle 1,200 cfs

while meeting biological screening criteria. Four new buildings are also proposed as part of the fish collection facility. These are an administration building, a maintenance building, a monitoring building, and a generator building. An access bridge will provide vehicle, utility, and personnel access to the new facility.

Objective

The objective of this measure is to provide downstream fish passage at HHD as part of an overall program to provide anadromous fish access to the Green River above HHD.

Rationale and Ecosystem Benefits

The upstream fish passage facility at the Headworks will provide adult anadromous fish access to the upper watershed. A downstream fish passage facility is also needed to safely pass outmigrating fish through the HHD project. Currently, juvenile salmon and steelhead migrating from the upper Green River to lower river rearing areas or migrating to salt water must pass through one of two HHD outlets (the flood control tunnel or a 48-inch-diameter bypass pipe). The flood control tunnel (1,035 feet) is regulated by two large radial gates. ~~that control the discharge by presenting a barrier to flow.~~ At **release** flows **of** less than 500 cfs, the bypass pipe is used (1,069 feet). Refill of the project typically occurs between early April through June when the pool is filled from low pool (1,070 feet) to the full conservation pool (1,141 feet; plus 3 to 5 feet for debris removal). Spring refill coincides with the main outmigration period of juvenile salmonids. As the pool fills, the outlets are submerged to depths of 35 to 112 feet. As inflow to the reservoir recedes, outflow from the dam is routed to the bypass pipe (flows less than 500 cfs).

Beginning in 1982, juvenile coho and chinook salmon and steelhead trout have been re-introduced into the upper watershed as a means to assess the ability of the existing configuration and operating plan of HHD to pass juvenile fish. Current annual survival of juvenile salmon and steelhead migrating through HHD outlets is estimated between 5 and 25 percent based on a fish passage model and on-site monitoring data (Dilley and Wunderlich 1992, 1993). The low survival rate is primarily a function of two factors: the spring refill of the reservoir submerging the dam outlets and the low survival of juveniles as they pass through the outlets. Juvenile fish require a near surface-outlet ~~(typically 5 to 20 feet deep)~~ with a high discharge capacity outlet (exact volumes depend on site conditions). Therefore, at a time when fish need high flows and a shallow outlet, the project is reducing outflow (refill) and creating a deeper outlet (from 35 to 112 feet deep). During outmigration fish may not find or be willing to use outlets that are deeply submerged. Fish that are delayed or entrapped beyond a certain time may not migrate to

salt water and may not contribute to the returning adult population. Fish that sound (dive) to reach the outlet pipe experience high mortality from impacts at sharp bends or turns within the bypass. Direct mortality in the bypass pipe can range from 1 percent to 100 percent depending on the amount of flow, water temperature, pool elevation, and time of year.

The new downstream fish passage facility is designed to provide much higher success of juvenile outmigration and to accommodate the higher water levels and changes in refill timing under the AWS project Phase I. With the floating fish collector and fish lock compensating for changes in reservoir level, previous problems with early refill of the reservoir on outmigration should be minimized. The fish passage structure (described in Chapter 4.2) has an operating flow range between 400 cfs and 1,200 cfs. The target design flow was approximately 1,200 cfs, which is the 50 percent exceedance flow for April and May during the peak outmigration of salmonid juvenile.

In the majority of years, releases from HHD will improve (decrease) instream temperatures up to 6 miles downstream of the dam. **The intake of the proposed downstream fish passage facility will be capable of operating at a range of depths. This flexibility in depth of submergence will allow for improved temperature control during the summer.** ~~Blending of surface and deeper water would occur sometime in July. After this time, t~~**T**he meeting of temperature requirements could constrain the use of the fish passage facility **in late summer**. To address these constraints, daily monitoring of outflow temperatures and fish passage will be required, as will close coordination with resource agency biologists.

Although the strategy for operating HHD to meet downstream flow needs during the conservation storage period will evolve through adaptive management, an experimental flow management strategy has been developed using blocks of dedicated and non-dedicated storage (see next HCM). As information and understanding of the relationships between the managed flow regime and the biotic resources of the Green River increases, the operation of the HHD can be refined within the range of legal and institutional requirements to balance needs of various fish species, life stages, and water supply.

This habitat conservation measure is intended to offset impacts of the HHD, a USACE activity that has direct benefits to Tacoma. The proposed downstream fish passage facility will address the effects of increased reservoir storage for water supply and storage for low flow augmentation to benefit fisheries resources. Tacoma will also provide funding to support development and implementation of a research program (see Chapter 6).

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5.2.2 Habitat Conservation Measure: HCM 2-02
Howard Hanson Dam Non-Dedicated Storage and Flow Management Strategy

HABITAT CONSERVATION MEASURE NUMBER: HCM 2-02

MEASURE: Howard Hanson Dam Non-Dedicated Storage and Flow Management Strategy

As local sponsor of the AWS project, Tacoma will support the USACE in developing an enhanced springtime operating strategy for HHD involving the management of dedicated and non-dedicated blocks of water to benefit fisheries resources. The maximum storage volume behind HHD is 106,000 acre-feet (ac-ft). The full storage volume is required to meet USACE flood control responsibilities in the winter months, but only a portion of the maximum storage volume is needed for flood control in the spring. Under the AWS project, up to 49,200 ac-ft of water will be stored behind HHD during the spring to meet fisheries and municipal and industrial water needs. The HHD springtime reservoir refill strategy will be required to always provide congressionally authorized flood control capacity behind HHD.

The USACE currently stores 24,200 ac-ft of water behind HHD between mid-March and early June for summer low flow augmentation for fisheries purposes. Storage of that block dedicated to low flow augmentation water was authorized during original development of the HHD project. Optional storage of up to 5,000 ac-ft of additional water dedicated to low flow augmentation is provided on an annual basis as part of the AWS project (use of this 5,000 ac-ft of water dedicated to aquatic resource needs is described in measure HCM 2-06). The AWS project also provides for storage of up to 20,000 ac-ft of water dedicated to municipal and industrial water supply use. The 20,000 ac-ft of water represents water available to Tacoma under the SDWR and is stored at a rate of up to 100 cfs per day within flow constraints measured at the USGS Auburn and Palmer gages as described in the MIT/TPU Agreement. Water stored behind HHD will be allocated as dedicated or non-dedicated blocks depending on whether the water is allocated to a specific purpose (e.g., water dedicated to municipal water supply or low flow augmentation) or is available for multiple use (non-dedicated).

Water that is stored and dedicated for municipal use will be available for use by Tacoma at any time. This stored municipal water represents a prior exercise of Tacoma's SDWR and its subsequent use and is not constrained by additional instream flow requirements. When Tacoma requests that stored municipal water be released from HHD, the USACE will comply with the request provided there is sufficient water remaining within the block of water dedicated to municipal use. When water is released from HHD at the request of Tacoma, the volume of water released for municipal use will be subtracted from the remaining municipal water storage account. Should Tacoma not use the stored water as it is released, whether through malfunction of Tacoma's facilities, excessive turbidity, or increased runoff associated with precipitation events. Tacoma's municipal storage account will be reduced by the volume of stored municipal water released.

The non-dedicated block of water can be managed in a variety of ways: released to meet immediate fishery resource needs; dedicated to low flow augmentation storage requirements; dedicated to municipal and industrial water supply to eliminate subsequent storage requirements; or held in reserve as non-dedicated storage to meet potential instream flow needs later in the spring. The non-dedicated storage volume is eliminated as the blocks of low flow augmentation and municipal water supply storage are filled. **Water that is released to the river from the non-designated block of storage (excess water or water needed by the USACE for the collection and handling of reservoir woody debris) from HHD is assumed to be fish conservation water. Fish conservation water shall not be diverted from the river by Tacoma.**

This non-dedicated block of water will provide resource agencies the opportunity to recommend adjusting the rate of storage and release during the refill season to benefit fisheries resources. Potential flow adjustments to benefit fish could include: 1) limits to the maximum rate of reservoir refill (the difference between the inflow and the outflow) to allow natural flow variations to aid downstream fish movement; 2) target instream baseflows to reduce side channel dewatering; 3) artificial freshets (short-term high flow releases from HHD) to speed the rate of downstream migrating salmonids; and 4) controlled long-term stage declines to protect steelhead redds. The magnitude, duration, and timing of each of these measures will be evaluated through a research program; changes to the refill and release strategy will be determined through an adaptive management process.

During the spring reservoir refill period, inflow to the reservoir may contain turbidity levels unacceptable for public water supply use. There has been a concern expressed by resource agency staff that Tacoma might request the USACE to both release the turbid water and subsequently dramatically curtail reservoir discharge in order to quickly refill the pool with clean water. Tacoma and federal and state resource agencies have developed a course of action and operational safeguards to minimize any potential adverse impacts to fish and wildlife resulting from the collection of a high turbidity pool.

In addition to reliance on the North Fork well field during high turbidity periods, Tacoma will utilize groundwater supplies to avoid the need to draw water from a turbid pool behind Howard Hanson Dam. During the preliminary engineering and design phase of the AWS project, Tacoma and the USACE will evaluate the potential risk of storing highly turbid water. If Tacoma is unable to be convinced that turbidity in stored water will settle by late May or early June, Tacoma will not proceed with the AWS project until filtration of the water supply can be achieved or until an alternative source of water supply has been developed to meet early summer municipal water needs. In the event that conditions were to occur that are currently unforeseeable, Tacoma agrees to take every effort to avoid actions which would be detrimental to the Green River's natural resources as the City attempts to meet its obligation to protect public health and safety through the supply of water. Tacoma would impose water use restrictions consistent with drought conditions and would coordinate with resource agencies and

the Muckleshoot Indian Tribe prior to requesting a modification of Howard Hanson Dam operations that might adversely impact Green River fisheries. Tacoma would not make such a request unless there was an imminent risk of violating Primary Drinking Water Standards along with the associated health risk of such a violation.

Objective

The objective of this measure is to support the development and implementation of a strategy for the operation of HHD that will provide maximum benefits to fisheries habitat, consistent with flood control and municipal water supply.

Rationale and Ecosystem Benefits

Howard Hanson Dam was originally authorized in 1958 and, since completed in 1962, has been operated by the USACE for flood control and downstream low flow augmentation. The HHD controls runoff from approximately 220 square miles of the Green River watershed and provides 106,000 ac-ft of reserve flood control volume to store watershed runoff. The maximum storage volume behind HHD is reserved for the storage of water during the peak flooding seasons, generally November through early February. Runoff from the upper watershed is impounded during storm events and released in a regulated manner to prevent flows in the Green River at Auburn from exceeding 12,000 cfs. After the impounded flows are released, the reservoir is emptied to provide storage for the next storm event. The full storage volume is required to meet USACE flood control responsibilities in the winter months, but only a portion of the maximum storage volume is needed for flood control in the spring. During the spring of each year, the reservoir is allowed to fill to provide water for low flow augmentation to meet the instream flow target of 110 cfs at Palmer. Since the construction of HHD, the springtime strategy of storing and releasing water has evolved. Additional information was developed on the effects of flow management on instream biological resources leading to changes in the springtime HHD operating regime.

HHD Operations: 1962 - 1983

The original authorization for HHD provided for the storage of 24,200 ac-ft of water at elevation 1,141 feet to be used for low flow augmentation for fisheries purposes. Prior to initiating summer refill, the project was operated in a run-of-river mode (i.e., HHD releases match HHD inflow). Although anadromous fish did not have access to the upper watershed prior to 1982, any fish moving downstream from the upper watershed during run-of-river operations passed quickly and safely through two large radial gates at the base of the dam at elevation 1,035 feet. When the radial gates were closed and the reservoir began filling, fish moving downstream were unable to use the radial gates to

pass downstream through the project. A 48-inch outlet pipe, located at elevation 1,069 feet and used for spring and summer flow releases of less than 500 cfs, provided the only available route for fish moving downstream. When the 48-inch outlet pipe became submerged by the rising pool level, fish moving downstream were either unwilling to sound to the outlet entrance and/or unable to find the outlet. Fish that were able to exit through the 48-inch outlet pipe suffered a high rate of mortality due to stresses caused by several 90-degree bends within the 48-inch conduit.

Beginning in 1982, juvenile anadromous salmonids were planted in the upper watershed. Although adult salmon had not been passed upstream of RM 61.0 since Tacoma's Headworks facility was completed in 1913, outplanting of juvenile salmonids was used to take advantage of upstream rearing habitat and to evaluate downstream passage through HHD. The original operational strategy for the HHD project, generally followed from 1962 to 1983, delayed the start of refill until June and thereby provided successful passage of downstream migrants through the radial gates. Once refill was initiated, nearly all inflow was stored and only water required to satisfy the instream flow target of 110 cfs at Palmer was released. Storing the water as quickly as possible minimized the duration, but exacerbated the magnitude of downstream impacts by dramatically cutting flows to the lower river once reservoir refill began. This refill strategy reduced flows from an average of 1,140 cfs at Auburn to a low flow of 234 cfs for an average 12-day period in early June (USACE 1995). This rapid rate of reservoir refill caused significant impacts to downstream fisheries, including the dewatering of steelhead redds throughout the lower river.

HHD Operations: 1984 - 1992

During the period between 1984 and 1992, the HHD operational strategy followed by the USACE generally consisted of initiating refill much earlier than the 1962-to-1983 practices to reduce impacts to steelhead redds, while also delaying refill as late as possible to facilitate downstream passage of juvenile outmigrants. Refill was started as early as 19 April. During refill, all inflow was stored except for releases to provide 200 cfs immediately below the Headworks. Although impacts of this strategy on steelhead redds were less severe than before, this practice was discontinued after 1991 (USACE 1995, HDR Engineering and Beak Consultants 1996).

HHD Operations: 1992 - Present

Beginning in 1992, the USACE operational storage strategy for HHD has involved periodic adjustments to meet a variety of resource needs. Releases from HHD are adjusted to account for changing inflow and weather conditions to provide additional

flows to benefit fisheries resources, with consideration for whitewater recreation opportunities and specific community activities (USACE 1995). Adjustments in the timing and rate of spring refill represent a compromise between the passage of juvenile outmigrants through the HHD reservoir and downstream fishery impacts. The refill strategy attempts to provide flows for steelhead spawning and incubation in response to expected weather and runoff conditions. Refill is started as early as mid-March to allow greater flexibility in achieving the full conservation pool at elevation 1,141 feet by early June. A relatively constant rate of refill of approximately 400 cfs is used to provide a more natural flow regime, and refill is initiated early to reduce the impacts of steelhead redd dewatering. This strategy involves frequent communication with members of the Green River Flow Management Coordination Committee. This interagency committee was formed in 1987 and consists of representatives from MIT, state, federal, and county resource agencies, and other groups. The USACE considers input from the group as an adaptive management strategy to adjust the refill and release regime based on a short-term planning horizon.

To date, the success of the adaptive management process has been limited by physical and operational project constraints. Storing water earlier in the year would provide added operational flexibility, but refill is constrained by the desire to pass downstream migrating fish through the project. Once the radial gates are closed, the rate of successful passage of downstream migrating juvenile salmonids through the HHD project drops dramatically.

The spring flow management regime is also limited by the need to reach the conservation pool by early June. The USACE manages reservoir refill and release to ensure that the 24,200 ac-ft of storage for low flow augmentation is achieved on a 98 percent reliability. Even if the Flow Management Committee recommends that refill be delayed, the USACE will override their suggestions to ensure the 24,200 ac-ft storage objective is not compromised. For example, during the spring of 1997, the committee recommended reservoir refill be delayed since the upper watershed was thought to contain an unusually high level of snowpack. Reservoir storage fell below the 98 percent refill rule curve and in late May the USACE temporarily reduced project releases to quickly fill the reservoir pool. The short-term increase in refill caused flow in the Green River at Auburn to drop from 3,230 cfs on May 19 to 900 cfs on May 27, before rebounding to 2,930 on June 2 (USGS 1997).

HHD Operations: Increased Storage under the AWS Project

As part of the AWS project, authorized uses of HHD will be expanded to provide ecosystem restoration benefits and municipal water supply. Up to 5,000 ac-ft of additional water would be stored for fisheries benefits and 20,000 ac-ft of water would be stored for municipal and industrial use. Under the SDWR, Tacoma can withdraw up to 100 cfs of water at its Headworks, provided instream flow requirements are satisfied at the Palmer and Auburn USGS gages as described in the MIT/TPU Agreement. Under the AWS project, instead of Tacoma withdrawing water at the Headworks between mid-February and late May, the USACE will store up to 20,000 ac-ft of water for Tacoma's municipal and industrial use. The summer conservation pool will be 1,167 feet and total 50,400 ac-ft of storage, which represents:

Storage Volume	Authorized Purpose
24,200 ac-ft	low flow augmentation (as part of original HHD authorization);
1,200 ac-ft	turbidity pool (non-active storage);
5,000 ac-ft	optional annual storage (AWS project fisheries benefits);
20,000 ac-ft	municipal and industrial use (AWS project municipal benefits);
50,400 ac-ft	total storage under the AWS project.

Integral to the adaptive flow management process associated with the AWS project is the need to forecast seasonal flow conditions and run-off in the Green River. During a spring drought with little snowpack, storage of 50,400 ac-ft of water represents over 35 percent of the total run-off measured at HHD (RM 64.5) between 15 February and 31 May (e.g., 1992 as estimated by the CH2M Hill daily flow model (CH2M Hill 1997). During a wet spring with high run-off conditions, storage of 50,400 ac-ft represents less than 10 percent of the total run-off measured at HHD (e.g., 1972 as estimated by daily flow model, CH2M Hill 1997). Forecasting flow conditions in the Green River basin requires reliable estimates of the volume of water stored as snow and ice in the upper watershed and the ability to forecast long-term weather patterns. Run-off forecasting is an imprecise science, but the reliability of forecasts will be improved with additional snowpack and precipitation monitoring stations in the upper Green River watershed (see Snowpack and Precipitation Monitoring Conservation Measure). Additional snowpack monitoring and improved runoff forecasting will benefit the reliability and flexibility of spring water storage and release.

During the spring reservoir refill period, inflow to the reservoir may contain turbidity levels unacceptable for public water supply use. There has been a concern expressed by

resource agency staff, that Tacoma might request the USACE to both release the turbid water and subsequently dramatically curtail reservoir discharge in order to quickly refill the pool with clean water. Tacoma representatives acknowledged this concern during a meeting with federal and state representatives in February 1999. During the meeting, a course of action and operational safeguards were established to avoid adverse impacts to fish and wildlife resulting from collection of a high turbidity pool.

Tacoma believes there is a low likelihood that a turbidity pool behind Howard Hanson Dam would cause a long-term public water supply operational problem. Tacoma has been advised by the USACE that turbidity problems which could occur during February, March, and in rare instances April, would clear up by late May or early June. This is a major issue for Tacoma since the continuing operation of their surface water supply as unfiltered depends in large part on their ability to provide the public with water that meets rigorous federal and state water quality standards. Tacoma will insist that additional evaluation of turbidity be conducted during the pre-construction engineering and design phase of the Howard Hanson AWS project. This additional evaluation will consist of hiring a consulting firm skilled in the evaluation of public water supply turbidity concerns to review the HHD operation and evaluate the nature of turbidity during high flow events on the Green River. If Tacoma is unable to be convinced that turbidity in stored water will settle by late May or early June, it would be forced to delay the AWS project until filtration of the Green River municipal water supply could be accomplished, or until an alternative source of supply to meet early summer municipal water needs has been developed.

Operationally, high turbidity periods on the Green River during the spring and early summer refill period would be accommodated through the use of Tacoma's groundwater sources in lieu of reliance upon Green River surface water. Tacoma currently has 72 million gallons per day (mgd) (113 cfs) of groundwater capacity from the North Fork Green River well field. Unfortunately, this full capacity is not available except for brief periods during the winter. It can never operate for a sustained period at 72 mgd. The only time the well field can produce 72 mgd without a water level decline is during heavy rainstorms. Aquifer storage capacity tails off during the summer and is at its lowest during the late summer and early fall. On the average, the North Fork well field has the following water supply capacities during the months when the Howard Hanson reservoir is being filled and turbidity is a concern:

North Fork well field sustained capacities (mgd) by month during Howard Hanson Reservoir refill operations (Source: Kirner, J. C. 1999. Letter to NMFS/USFWS/WDFW dated 26 March 1999, Tacoma Water, Tacoma Public Utilities, Tacoma Washington).

	February	March	April	May	June
mgd	48	36	24	24	24
cfs	75	56	37	37	37

In addition to reliance on the North Fork well field during high turbidity periods, Tacoma has groundwater supplies available in the Tacoma area. Tacoma's water rights in the vicinity of the City of Tacoma are approximately 90 mgd (140 cfs). This capacity, coupled with the water available from the North Fork well field, would meet Tacoma's demands for water in the event of a turbidity emergency on the Green River. Tacoma would rely on these two primary sources of groundwater to avoid the need to draw water from a turbid pool behind HHD.

In the event that conditions were to occur that are currently unforeseeable, Tacoma agrees to make every effort to avoid actions which would be detrimental to the Green River's natural resources as the City attempts to meet its obligation to protect public health and safety through the supply of water. Tacoma would impose water use restrictions consistent with drought conditions and would coordinate with resource agencies and the Muckleshoot Indian Tribe prior to requesting a modification of HHD operations that might adversely impact Green River fisheries. Tacoma would not make such a request unless there was an imminent risk of violating Primary Drinking Water Standards along with the associated health risk of such a violation.

Under the AWS project, reservoir refill could begin as early as mid-February, provided that available storage volumes for flood control are not compromised. The construction and operation of a downstream fish passage facility at HHD would provide for the downstream passage of outmigrating fish while allowing the reservoir to begin filling. The AWS project provides the opportunity to store water while managing downstream flows to benefit fish. However, maximizing those benefits requires a different approach to springtime flow management (described below) than has been used since 1992.

Potential HHD Operational Strategy: Dedicated and Non-Dedicated Storage

To minimize the effects of storing additional water behind HHD during the spring, Tacoma initiated an intense modeling effort using a 32-year record of daily flows to evaluate alternative reservoir refill strategies. This process resulted in the proposed management plan involving the use of dedicated and non-dedicated blocks of water. The

rate of water storage would be accelerated early in the spring before the majority of juvenile salmonids have begun their downstream migration. Storage would be completed by mid to late May to avoid impacts to steelhead redds. The accelerated rate of water early in the refill season would establish a block of non-dedicated storage. The volume of water in non-dedicated storage would be managed in response to input from the Green River Flow Management Committee (GRFMC).[1] The non-dedicated block of water could be used to meet a variety of fishery needs, including:

- augmenting HHD releases during short-term low flow periods in March, April and May;
- augmenting HHD releases during late May and June to protect steelhead incubation;
- suspending HHD storage during storm events to allow freshets to pass; or
- in the absence of a natural freshet, providing a short-term release of high flows to aid downstream migrating salmonids.

In the course of Tacoma's modeling efforts, an initial AWS project flow management strategy was developed that attempted to balance the needs of fisheries and water storage. This strategy ensured refill of the conservation pool while meeting a variety of fisheries protection standards. If implemented, the effects of this strategy would be monitored (see

[1] Recommendations on the storage and release of water from Howard Hanson Dam will be developed through the USACE's coordination with the Green River Flow Management Committee (GRFMC). The GRFMC consists of representatives of tribal and natural resource agencies convened by the USACE to recommend adaptations in the water storage and release regime of Howard Hanson Dam. Responsibility for operation of Howard Hanson Dam lies with the USACE. The USACE, in turn, must comply with project purposes as identified by congressional authorization and must abide by NMFS and USFWS direction through Section 7 consultation under the Endangered Species Act.
The GRFMC consists of representatives from the:

USACE	U.S. Army Corps of Engineers;
NMFS	National Marine Fisheries Service;
USFWS	U.S. Fish and Wildlife Service;
MIT	Muckleshoot Indian Tribe;
WDFW	Washington State Department of Fish and Wildlife;
Ecology	Washington State Department of Ecology;
King County	King County Department of Natural Resources; and
Tacoma	Tacoma Public Utilities, Tacoma Water.

Representatives from other groups; such as Trout Unlimited and Friends of the Green River have participated in past meetings of the GRFMC. It is up to the USACE, and ultimately the NMFS and USFWS to determine the degree of influence of each member of the GRFMC.

Chapter 6) and adjustments implemented under the recommendations of the GRFMC. Fisheries protection standards and potential flow adjustments include: maximum refill rates; target baseflows; and the release of artificial freshets if deemed beneficial by the GRFMC. These potential flow adjustments are further described below:

Maximum Refill Rate. Under Phase I of the AWS project, the 400/300/200 flow management strategy modeled using the 32-year record of daily flows includes a maximum refill rate of:

- **192** cfs per day (5,000 ac-ft maximum) from 15 February through 28 February,
- **400** cfs per day (800 ac-ft per day) in March,
- **300** cfs per day (600 ac-ft per day) in April, and
- **200** cfs per day (400 ac-ft per day) from May through June.

Outmigration studies conducted at HHD in 1984 and 1991-1995 show that inflow, outflow, and refill rate all influence successful smolt outmigration (Dilley and Wunderlich 1992, 1993). In general, it is thought that higher flows through the HHD result in faster smolt migration through the project and higher smolt survival. To date, empirical data have been collected that have evaluated smolt travel times occurring with fill rates up to 400 cfs per day. Further studies are needed to more fully determine the overall effects of different refill rates. Such studies should lead to the identification of those rates that maximize passage success of juveniles through the bypass facility. The timing associated with the different rates reflects the concept of initiating reservoir refill prior to the peak of smolt outmigration, and while refill should be aggressive, the maximum rate should be limited to provide variation in stream flow while reducing the incidence and magnitude of side channel dewatering.

During 1999 **and 2000**, the USACE in response to requests from the GRFMC, has attempted to store a percentage of inflow rather than a **daily** fixed volume of water. This alternative storage refill strategy holds promise for benefiting both fishery and water storage needs. The strategy of storing a percentage of inflow will be further evaluated during the preliminary and engineering design phase of the AWS project.

Target Baseflows. The proposed instream baseflow targets for the Green River at Auburn based on Tacoma's modeling efforts for refill of the HHD reservoir are:

	Flow Condition		
Month	Wet	Average	Dry
15-28 February	900	900	900
March	900	750	575
April	900	750	575
May through 1 July	linear drop 900 to 400	linear drop 750 to 400	linear drop 575 to 250

Modeling of daily flows over the 32-year period of 1964 to 1995 suggests these target baseflows can be maintained while meeting other fisheries protection standards such as refill rates and freshets. These baseflow targets are goals rather than commitments and can be adjusted based on changes in weather patterns, results of monitoring efforts, and input from fishery resource managers. These target instream flow levels are much higher than the low flow levels that have been previously associated with HHD refill and should benefit downstream fisheries.

From February through June, salmonid fry are emerging and rearing in shallow mainstem channel margins and side channel habitats of the Green River. Off-channel habitats (i.e., side channels, sloughs) are thought to be vital components of salmonid production in Pacific Northwest rivers (Bustard and Narver 1975; Sedell et al. 1984; Beechie et al. 1994). Peterson and Reid (1984) estimated that, annually, 20 to 25 percent of the total smolt yield in the Clearwater River, Washington, comes from side channel habitat. In British Columbia, approximately 16,000 juvenile coho salmon overwintered in a side channel in the upper Squamish River (Sheng et al. 1990). Cowan (1991) found that five groundwater-fed side channels on the East Fork Satsop River, Washington, produced between 19 and 71 chum fry per square foot of channel area. Swales (1988) hypothesized that side channels supplied higher water temperatures **in the winter** due to groundwater inflow and provided greater food availability, which increased overwinter survival of juvenile coho when compared to the mainstem habitats in the Fraser and Keough rivers, British Columbia. A total of 59 side channel areas were identified in a survey of the middle Green River in 1996 (USACE 1998). Side channels in the Green River provide spawning and/or rearing habitat for all Green River salmonids and, for chum salmon, may provide the majority of spawning habitat (Coccoli 1996). Short-term flow reductions can isolate side channel habitat from the mainstem channel and cause mortality by trapping juvenile salmonids and exposing them to predation, poor water quality, or reduced food supply.

During the spring, juvenile salmon and steelhead are migrating downstream to the estuary. Many researchers believe there is a general positive relationship between flow

and outmigrant survival, although the relationship appears to vary widely for different species under different environmental conditions. In the Green River, researchers in the late 1960s conducted experiments using marked releases of hatchery chinook salmon (Wetherall 1971). They identified a general trend associating increased smolt survival with increased flow in the lower river. Maintaining higher baseflows is assumed to benefit outmigrant survival by increasing their rate of migration through the HHD reservoir and lower mainstem river.

Artificial Freshets. In order to evaluate the range of flexibility afforded by this habitat conservation measure, the daily flow regime was modeled to include the release of two freshets during the spring. The freshets would be timed for April and May to aid downstream migrating salmonids and to temporarily re-connect side channels. Each freshet is assumed to be a maximum flow of 2,500 cfs for 38 hrs at the Auburn, Washington, gage during normal years, and 1,250 cfs for 38 hrs during dry years. The magnitude and duration of the artificial freshets was identified through analysis of water travel times associated with HHD releases as part of the AWS project (USACE 1998). Recommendations on timing, magnitude, duration, and need to release non-dedicated storage as a freshet would be made by the GRFMC based on the results of monitoring.

Side channels and sloughs provide the majority of chum salmon spawning habitat in the Green River (Coccoli 1996). Isolation of these side channels can increase chum mortality by trapping fry that would otherwise be migrating downstream to the estuary. Chum salmon typically migrate within several days to weeks following emergence. Chum fry that have emerged in side channels but are isolated by low water levels may not survive unless they have access to the mainstem channel.

Past reservoir refill operations have stored or captured naturally occurring short-term fluctuations in flow, also referred to as freshets. In some years, this has resulted in a flat or constant outflow rate during reservoir refill. Results of outmigration studies in the Green River have shown that a sharp increase in flow can stimulate increased downstream movement of smolts (Dilley and Wunderlich 1992, 1993). In the upper Snake River, Idaho, researchers found that a two-fold increase in flow increased the migration rate by eight to 12-fold for hatchery chinook, 3.5- to 4.6-fold for wild chinook salmon, 1.6- to 2.1-fold for hatchery steelhead trout, and 2.4-fold for wild steelhead (Buettner and Brimmer 1996). Knapp et al. (1995) concluded that the initial rise in flow appeared to push fish out, but that sustained fish movement was not positively correlated with prolonged high flows; pulsing water releases appeared to increase the effectiveness of moving fish out of the lower Umatilla River, Oregon. Outmigration studies in the

Stanislaus River, California, revealed that a pulse in flow from the release of stored water stimulated a substantial increase in juvenile chinook outmigration. However, increases in fish movement lasted only a few days following an increase in releases of stored water (Demko 1996).

Summary and Example of Proposed Flow Management Strategy using 1995 Daily Flows

Collectively, these flow management measures are intended to help minimize the effects of the USACE storage and release of water at HHD on fishery resources. The HHD downstream fish passage facility allows storage of springtime water much earlier than under existing conditions, while enhancing the downstream passage of salmonid smolts through the HHD project. These features allow reservoir refill to begin earlier than previous HHD management regimes and provide for the use of dedicated and non-dedicated blocks of storage. An example of how the proposed management strategy would be implemented using the 1995 daily flow record (average runoff conditions) is provided in Figure 5-2. For comparison purposes, flows in the Green River at Auburn under the proposed adaptive management regime are plotted with the flow regime that would have occurred under a storage regime involving a constant capture of 237 cfs. A constant rate of 237 cfs of storage between mid-February and 31 May would meet the storage target volume and allow natural flow variations to persist through the downstream reaches.

The level of water stored in the various dedicated blocks of water under the 400/300/200 storage refill strategy using 1995 flows are shown by time interval in Figure 5-3. Note that although different blocks of water are described, it simply represents an accounting convention. All water is stored in the single pool behind HHD. By the end of the storage period, water has either been dedicated to specific use (low flow augmentation or municipal water supply) or released to meet downstream needs. The use of the non-dedicated storage block is discontinued by the end of the spring storage period.

February

As previously described, storage of water would begin on 15 February; however, in this example the rate of storage is limited to 108 cfs during February, due to flood control concerns. As shown in the accompanying figure, by 28 February nearly 2,700 ac-ft of water would be held as dedicated storage for municipal water use at the rate of 100 cfs per day. Water held as dedicated storage for municipal use represents that volume available to Tacoma under the SDWR as constrained by the MIT/TPU Agreement. This scenario assumes that 100 cfs per day would be available under the SDWR for the entire

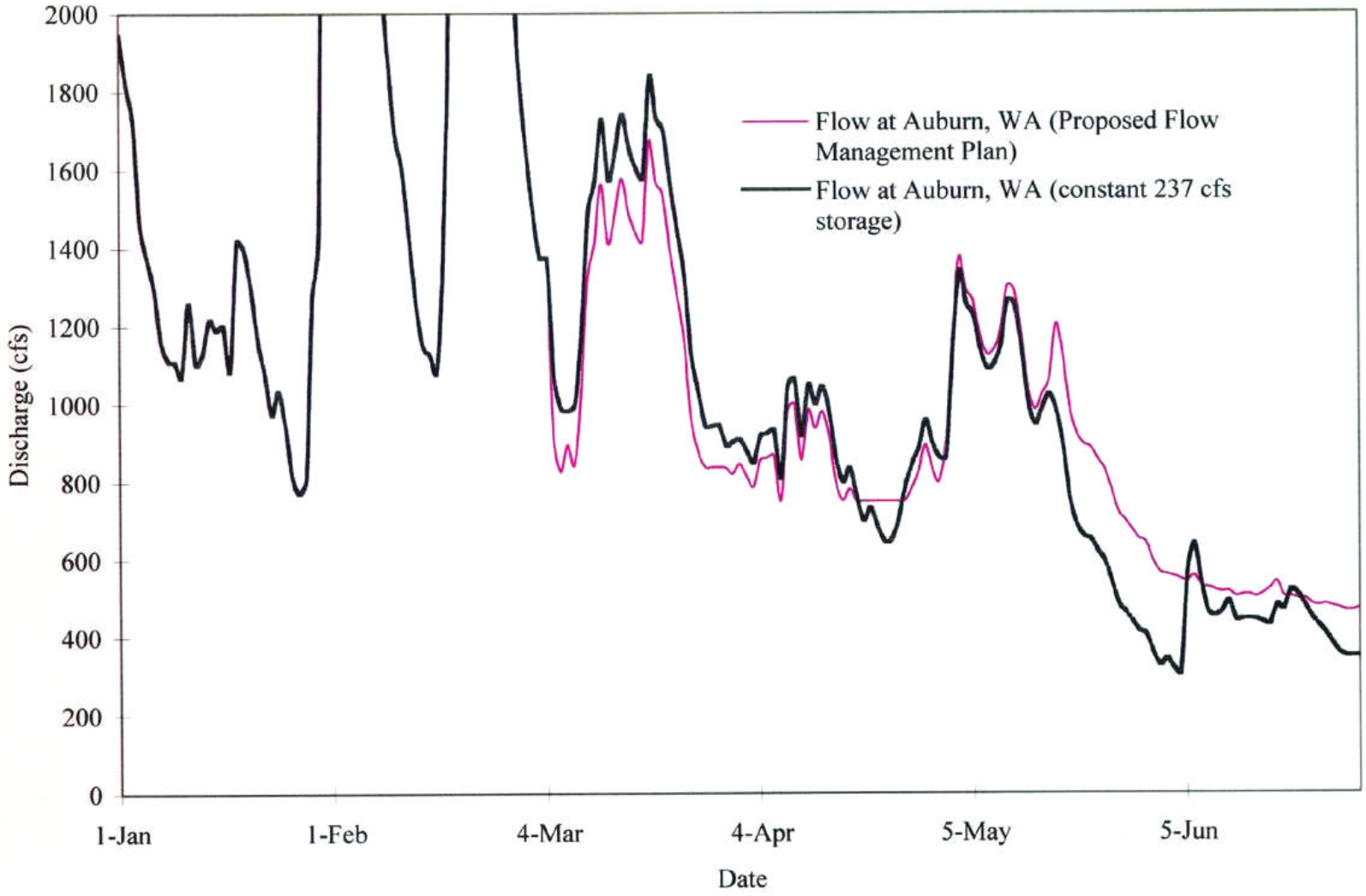
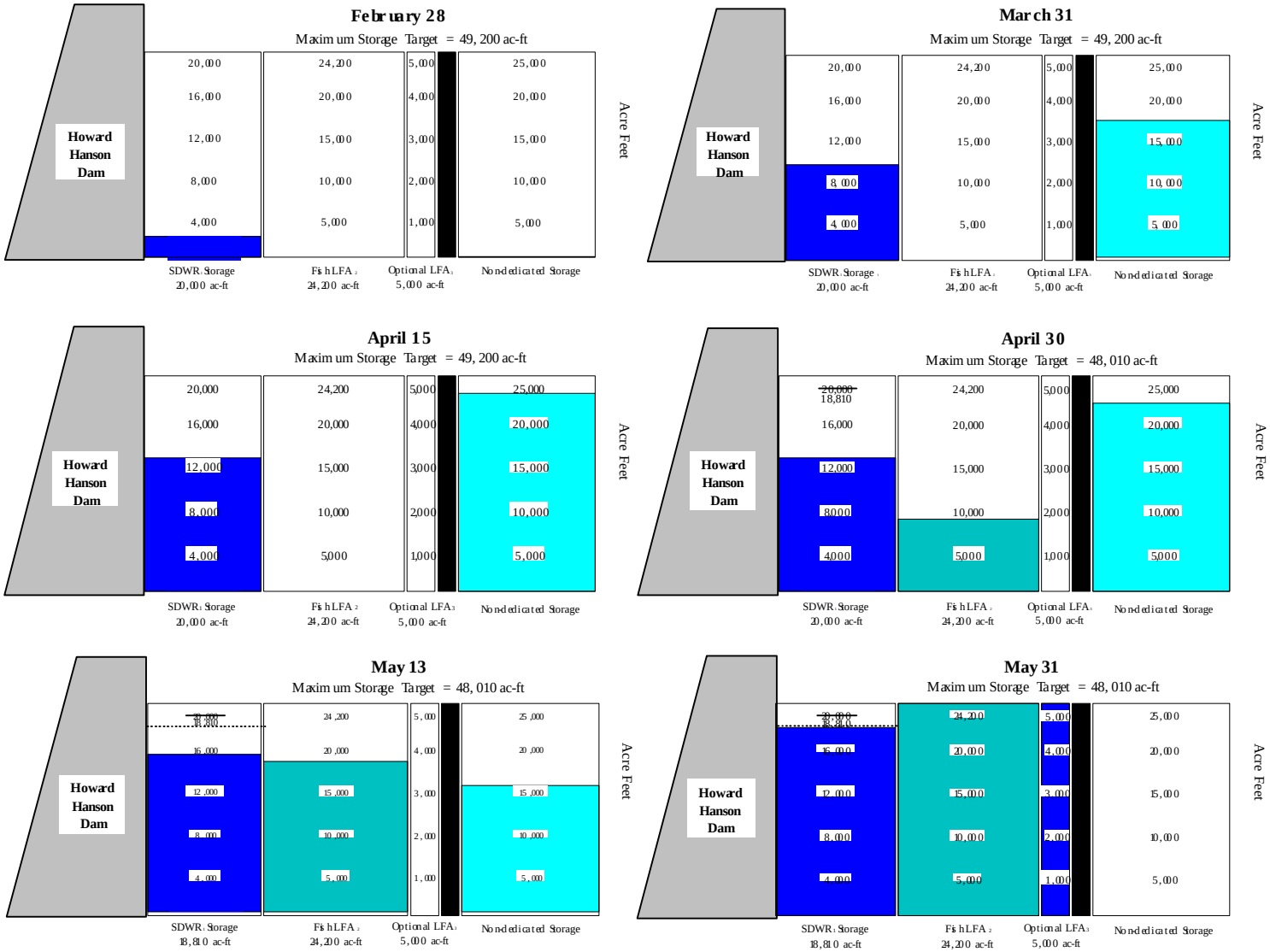


Figure 5-2. Comparison of Green River flows (cfs) at Auburn, WA (USGS Gage No. 12113000) during 1995 under flow management regime proposed for the AWS project (USACE 1998) and a 237 cfs constant storage regime.



1 Second Diversion Water Right (SDWR) allows Tacoma to withdraw water up to 100 cfs per day depending on flow rates ~~at Palmer gage~~.
2 24,200 ac-ft of water is stored to augment low flow in the Green River, storage of the water was authorized with the construction of HHD.
3 Optional storage up to 5,000 ac-ft.

Figure 5-3. Maximum storage volumes in Howard Hanson Reservoir, Washington, 1995.

14-day period. The non-dedicated block of storage would hold approximately 300 ac-ft of water.

March

During March, the rate of reservoir refill would be increased to 400 cfs and the majority of storage would be held as the non-dedicated block of water. During this period, flows in the Green River would occasionally dip 100 cfs lower than under the constant storage regime but would still be above 800 cfs. By the end of March, the block of water dedicated to municipal use would hold 8,900 ac-ft. Water held as dedicated storage for municipal use represents that volume available to Tacoma under the SDWR as constrained by the MIT/TPU Agreement. Under the terms of the Agreement, Tacoma can exercise the 100 cfs SDWR when flows in the Green River exceed minimum flow requirements of 300 cfs at the Palmer gage site. This scenario assumes that 100 cfs per day would be available under the SDWR for the entire month. The non-dedicated block of water would hold nearly 18,000 ac-ft. No water would need to be dedicated for the low flow augmentation block during March since storage under the USACE 98 percent refill guide curve does not begin until 16 April.

April

During April the refill rate would be reduced to 300 cfs under the 400/300/200 flow management strategy. Flow in the Green River at Auburn under the proposed management plan would drop to 750 cfs in early April and remain about 100 cfs lower than would have occurred under the constant 237 cfs storage regime. In late April, however, flows under the constant storage regime would have dropped below 650 cfs. Under the 400/300/200 strategy, a portion of the non-dedicated storage would have been released to augment flows and ensure flows do not drop below 750 cfs. If, during this naturally occurring low flow period, flow in the Green River drops below the flow requirements allowing withdrawal/storage of water under the SDWR, the municipal storage target would be reduced by 100 cfs for each day that withdrawals would not have been allowed under the MIT/TPU Agreement. On the days that SDWR withdrawals would have been constrained by low flows in the Green River, no water would be dedicated to municipal use. Assuming SDWR withdrawals would have been disallowed for 6 days, the total municipal storage target would be reduced from 20,000 ac-ft to 18,810 ac-ft. By the end of April, approximately 13,700 ac-ft of water would be dedicated to municipal use, and 9,000 ac-ft would be dedicated to low flow augmentation. Approximately 22,000 ac-ft of water would be held as non-dedicated storage.

May

Under the proposed flow management strategy, reservoir refill would be reduced to 200 cfs in May. By 13 May, total reservoir storage would be 48,010 ac-ft. Sufficient non-dedicated water would be held to completely fill municipal and low flow storage requirements, including optional storage of 5,000 ac-ft. The GRFMC would have the option at this point to recommend releasing some of the water as a freshet, to parcel the water out to maintain higher baseflows, or to dedicate the water to municipal or low flow augmentation blocks. If water is released to meet downstream needs, the 200 cfs rate of reservoir refill (interception of inflow) would continue until the municipal and low flow augmentation storage blocks are filled. If water available in the non-dedicated block is transferred to completely fill the municipal and low flow augmentation storage needs, then storage of additional water would cease and use of the non-dedicated storage block would be discontinued.

Under the proposed flow management strategy, the baseflow target during the period 1 May through 1 July is a gradual linear decline from 750 cfs to 400 cfs. Green River flows at HHD would be augmented to maintain the baseflow target at Auburn. The intent is to maintain flow levels that benefit incubating steelhead redds as the flow regime gradually declines as spring progresses into summer. Under this scenario, flows in the Green River would be more than 200 cfs higher than what would have occurred under the 1996 refill regime. Instead of flows dropping to 305 cfs in early June, the proposed management regime maintains an instream flow of more than 500 cfs.

Summary

Past operation of Howard Hanson Dam has been constrained by the structural limitations of project facilities constructed in the early 1960s and by the USACE's precise implementation of congressionally authorized project purposes. As local sponsor of the Howard Hanson Dam-Additional Water Storage Project, Tacoma is supporting the USACE's efforts at developing operational procedures based on adaptive management to improve the protection of fisheries resources. The construction of a downstream fish passage facility will improve physical water control capabilities at HHD and implementation of a dedicated/non-dedicated flow management strategy will aid in the development of improved operational flexibilities. The increased opportunity for flow management is designed to partially offset the impact of Tacoma's use of the Green River for municipal water supply.

As part of the Howard Hanson Dam AWS project, the USACE will store water that is available to Tacoma for municipal use under the Second Diversion Water Right (SDWR).

Following construction of the AWS project, up to 100 cfs of water (198.2 ac-ft per day) will be stored behind HHD beginning in mid-February and dedicated for use by Tacoma. The municipal water storage rate of 100 cfs reflects Tacoma's exercise of the SDWR as constrained by limitations identified in the 1995 MIT/TPU Agreement. Storage of water for municipal use will continue until the maximum municipal storage volume of 20,000 ac-ft is achieved (minimum of 101 days or 26 May). The daily storage of 100 cfs represents a flow limitation of the AWS project, and the increased reservoir storage volume presents a potential delay or barrier to salmon fry moving downstream from the upper watershed.

Water in excess of that dedicated to Tacoma's municipal use (100 cfs) will be available for storage or release under the recommendations of the GRFMC. The maximum refill rate of the Howard Hanson reservoir has been tentatively identified as 400 cfs in March with a lower refill rate in other months. An alternative refill strategy, based on a percentage of reservoir inflow, is also being considered as a future storage regime. Under either storage regime, the volume of water stored in excess of that dedicated to municipal use can represent the majority of the HHD storage volume by the end of March. Under the proposed dedicated/non-dedicated flow management strategy, the USACE will consider the recommendations of the GRFMC before implementing flow management changes. The USACE is responsible for operation of Howard Hanson Dam and will consider input from the GRFMC, but must also comply with project purposes as identified by congressional authorization. Due to the recent listing of chinook salmon as a threatened species, USACE operations must now respect the direction of the NMFS and USFWS through Section 7 consultation under the Endangered Species Act. While the daily storage of up to100 cfs of water dedicated to municipal use reflects a limitation of the AWS project; increased operational flexibility is the cornerstone of the dedicated and non-dedicated flow management process.

Under the AWS project, structural changes to HHD, partially funded by Tacoma will provide increased operational flexibility. Examples of increased operation flexibility include: an earlier storage start date; increased control of rate of refill and release; reservoir surface release instead of bottom release; increased storage capability; and improved fish passage survival at HHD. These structural modifications allow the operational flexibility, which is required for the dedicated/non-dedicated flow management strategy. Under this proposed strategy, water in excess of the 100 cfs dedicated to municipal use can be used to meet immediate downstream fishery resource needs; dedicated to low flow augmentation storage requirements; dedicated to municipal storage to reduce subsequent storage requirements; or held in reserve as non-dedicated

storage to meet instream needs later in the refill season. The non-dedicated storage volume is gradually eliminated as the blocks of low flow augmentation and municipal water supply storage are filled.

The proposed flow management strategy has been developed within the framework of an adaptive management program. Key elements of the program include experimentation monitoring, analysis, and synthesis of results, followed by changes to the reservoir storage and release regime and continued monitoring and analysis. The proposed adaptive management program ensures that as additional information is developed, flows can be managed to minimize the detrimental effects of past and ongoing human perturbations and complement basin-wide restoration activities. Ongoing efforts by the USACE and King County, as part of the Green**/Duwamish Ecosystem** ~~River~~ Restoration Project, may provide new opportunities to restore ecological functioning of the Green River. In the face of imperfect knowledge, the proposed adaptive management program provides the greatest chance for the conservation and recovery of threatened and endangered species.

The opportunity to manage flows in the Green River for fisheries benefits is greatly increased under the proposed flow management strategy. However, identifying the effects of alternative flow management strategies will require research of fishery resources during the initial years of project operation. As local sponsor of the AWS project, Tacoma has committed to providing a research fund as described on Chapter 6.

5.2.3 Habitat Conservation Measure: HCM 2-03 Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Measures

HABITAT CONSERVATION MEASURE NUMBER: HCM 2-03

Measure: Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Measures

Tacoma will contribute funds for a series of habitat rehabilitation projects in the upper Green River as mitigation for inundation of additional reservoir area resulting from Phase I of AWS project. Project numbers assigned to each activity by the USACE are listed in parentheses. Projects to be funded by Tacoma under this HCM **are described below** ~~include~~:

Riparian and Stream Habitat Rehabilitation – In Reservoir

Mainstem and North Fork Channel Maintenance (MS-02; TR-04). These projects will maintain instream habitat and bank stability along the mainstem Green River and the North Fork Green River in the new inundation pool. Project features include: ~~1) placement of boulders to maintain bank stability in the existing channel; 2~~**1**) addition of large woody debris to create cover for fish; **2) placement of large boulders in select locations to maintain bank stability;** 3) excavation of sub-impoundments, off channel ponds, side channels, and dendrites. In addition, inundation tolerant vegetation will be planted along stream channels within the new inundation zone (1147 to 1177 feet MSL)

Tributary Stream Channel Maintenance (TR-05). This project will involve planting of inundation tolerant vegetation and placement of boulders and LWD within the newly inundated areas of Charley, Gale, Cottonwood, and MacDonald creeks.

Page Mill Pond Mitigation and Protection (VF-05). This project will maintain and improve an existing wetland pond complex within the floodplain of the North Fork Green River within and above the new inundation pool. A series of small ponds will be excavated in the floodplain of the existing pond complex. Native wetland plants will be planted above the new inundation pool, and inundation tolerant plants will be planted within the new pool. LWD will be placed in the ponds, at the pond outlet and in Page Mill Creek.

Lower Bear Creek (TR-01). This project site includes the lower 3,000 feet of Bear Creek, a large tributary that enters the Green River just below HHD at RM 63. Stream channel habitat will be rehabilitated by adding LWD and boulders, in conjunction with limited excavation to recreate meanders and backwater habitats. **This project site was identified in the Draft EIS for the AWS project as a potential conservation measure to offset impacts of reservoir inundation (USACE 1998). During 2000, the USACE, in coordination with the Services, considered replacing AWS project measure TR-01 with an alternative measure involving placement of LWD in the mainstem Green River. The USACE believes that placement of large woody debris will provide superior environmental benefits to the Lower Bear Creek measure as originally envisioned.**

Stream Habitat Rehabilitation - Above Reservoir

Abandoned Mainstem Channel at RM 83 (MS-04). A series of LWD jams will be constructed to re-route flow back to the natural channel in the mainstem Green River between RM 83 and RM 84. Currently, the river has abandoned its historic channel and is eroding the old Lester Airstrip and a mainline road adjacent to the river.

Mainstem LWD Placement (MS-08; TR-09). This project will involve placement of clusters of large trees approximately every 0.5 mile between RMs 71.3 and 80.3 in the mainstem Green River; in 4,600 feet of the North Fork Green River between elevation 1,240 MSL and 1,320 MSL; and in 1,200 feet of Gale Creek between elevation 1,240 MSL and 1,280 MSL.

The final design of these conservation measures will be developed during the pre-construction engineering and design (PED) phase of the AWS project. Large woody debris frequency and size requirements appropriate for the channel type will be determined using habitat criteria such as those recommended by the Washington Watershed Analysis Manual (WFPB 1997) or comparable systems approved by the Services.

Alternate measures will be implemented if any of the above measures are determined to be infeasible, or not cost-effective during the final design, or if environmentally superior measures can be implemented at comparable cost. Any alternate measures will have habitat benefits greater than or equal to the measure originally proposed, and will be reviewed and approved in advance by the NMFS and USFWS.

Objectives

The objective of this measure is to rehabilitate and/or enhance fisheries habitat in the Green River and its tributaries above HHD.

Rationale and Ecosystem Benefits

Riparian and Stream Habitat Rehabilitation – In Reservoir

Implementation of the AWS project will result in the inundation of additional areas habitat in the mainstem Green River and lower segments of a number of tributaries, including the North Fork Green River, Gale Creek, and Page Creek. The inundation will convert the lower segments of the streams from riverine to lacustrine (lake) type habitat on a seasonal basis. Rehabilitation activities included in this HCM focus on the inundated portions of major tributaries and on existing off-channel rearing sites or nearby highly impacted reaches.

Wildfires burned much of the riparian area in the upper Green River basin early this century, and, in combination with more recent flooding, mass wasting, and timber harvest, are believed to have reduced levels of in-channel LWD and increased deposition of coarse sediment (USFS 1996). The existing LWD frequency is currently less than the 2 pieces per channel width recommended for channels with “good” habitat conditions (WFPB 1997) in the majority of channels surveyed.

Riparian management zones within the natural zone are currently composed primarily of coniferous timber 60 to 90 years of age, and are just reaching the age that they would begin to contribute functional LWD. The riparian management conservation measures are intended to maintain or restore long-term LWD recruitment as stream adjacent stands

of timber mature. This conservation measure will provide immediate benefits in the form of increased instream structure and creation of additional off-channel rearing and refuge habitats. The conceptual designs of specific projects to be implemented are described below.

Mainstem and North Fork Channel Maintenance. Approximately two miles of habitat in the mainstem Green River and North Fork Green River will be inundated with the additional pool raise. Existing trees within the inundated riparian zones will be retained as described in the Standing Timber Retention HCM. Under this HCM, bare areas in and along the new seasonal inundation zone will be planted with vegetation that tolerates inundation and boulders, and LWD will be placed to create cover for fish. Planting sedges will protect newly inundated portions of the reservoir from erosion that results from wave action and provide some littoral cover for juvenile fish. It is expected that boulders (b axis >3 feet) will be placed at a rate of 30/1,000 feet (300 total) and LWD (>12 inch diameter and at least 20 feet long) will be placed at a rate of 40 per 1,000 feet (400 total). At least 25 percent of the pieces will be of sufficient volume to meet the requirements for key pieces. If key size pieces are not available, LWD will be clumped and anchored to promote stability.

Ponds, side channels, and dendrites will be excavated in the floodplain adjacent to the mainstem and North Fork Green River to increase the quantity of off-channel habitat available when the pool is full. Tentative mainstem off-channel habitat locations include a 1,400 foot side channel on the left bank at elevation 1,153 feet MSL; two small sub-impoundments on the right bank at elevations 1,156 and 1,158 feet MSL respectively; one side channel or two small sub-impoundments on the right bank at elevation 1160 MSL; and one 600-foot side channel and plus two sub-impoundment on the left bank at elevation 1163 MSL. Two 300-foot long side channels and two beaded ponds will be developed on the North Fork Green River.

Tributary Stream Channel Maintenance. Approximately one mile of habitat will be inundated in Charley, Gale, Cottonwood, Piling, and MacDonald creeks with the additional pool raise. Bare areas in and along the inundated streams will be planted with vegetation that tolerates inundation. Large boulders (b-axis > 3feet) will be placed in the inundated areas at a rate of 40 per 1,000 feet (165 total). LWD will be placed in the inundated areas at a rate of approximately 2 pieces per channel width (220 pieces total). Placement of LWD and boulders will increase habitat complexity within the inundated areas.

Page Mill Pond Mitigation and Protection. Three new ponds will be created in the existing pond wetland complex located near RM 2 on the North Fork Green River where seepage from the North Fork aquifer creates a tributary stream known as Page Mill Creek. The ponds will be excavated from the valley floodplain and log weirs installed as outlet controls. Approximately 20 acres of wetland plants will be planted, and 150 pieces of LWD (at least 12-inch diameter and 20-feet long) will be placed in Page Mill Creek and the new ponds.

~~***Lower Bear Creek.*** Lower Bear Creek was degraded by construction of Howard Hanson Dam and re-alignment of the railroad (USACE 1998). Boulders and LWD will be placed in the 300 feet of channel between the railroad bridge and the mainstem Green River to confine the channel and increase pool depth and bank stability. Structural placement is expected to consist of approximately 60 boulders with a diameter (b-axis) greater than or equal to 3 feet, and approximately 100 pieces of LWD, to establish an overall LWD frequency of 2 pieces per channel width. Selected portions of the channel will be excavated to create meanders and approximately ten 50-foot long backwater channels. An additional 50 pieces of LWD will be placed in these channels to improve the quality of the created habitat. Riparian habitat will be improved by selectively removing hardwoods to open the canopy, and planting a variety of coniferous tree seedlings.~~

Stream Habitat Rehabilitation - Above Reservoir

Abandoned Mainstem Channel at RM 83. Between RM 83 and RM 84 the Green River has abandoned its historical channel and begun eroding a road adjacent to the river. The new channel is shallow, braided, and has few pools. The former channel has an intact riparian zone, stable banks, and more natural channel morphology. Flow will be diverted back to the historic channel using debris jams and deflector logs. Each debris jam will contain at least one key-sized piece of LWD. In addition, 50 pieces of LWD will be placed in the historic channel. Each piece of LWD will be at least 12 inches in diameter and 20-feet long.

Mainstem LWD Placement. This project is designed as partial mitigation for the area of channel inundated by the AWS project pool raise. Between RM 71.3 and 80.3 in the mainstem Green River, clusters consisting of three or four large trees with attached rootwads (at least 60-feet long; rootwads ≥ 4-feet diameter) will be placed approximately every 0.5 miles. Key piece size LWD will also be added to Gale Creek and the North Fork Green River at the rate of one cluster per 0.5 miles of habitat. Clusters will be placed within the channel with rootwads facing upstream, or along the low-flow channel margins. Placement of clusters along channel margins is expected to promote the

formation of lateral and bar apex jams as additional wood collects on the clusters. Lateral log jams that collect at the outside of meander bends are a common natural structure in streams with bankfull widths greater than 65 feet (Slaney et al. 1997). Bar apex jams form when a single key-size piece with attached rootwad deposits oriented nearly parallel to flow and smaller pieces of LWD oriented roughly perpendicular to flow collect on the upstream side of the rootwad. This type of jam is common in large, meandering alluvial rivers (Abbe and Montgomery 1996). Assuming that the average frequency of key-size pieces in large channels is comparable to that observed in smaller channels (i.e., 0.25 pieces per channel width), the target number of key pieces per mile for the mainstem Green River was determined to be seven.

Unless state-of-the-art science suggests otherwise, LWD specifications will call for establishing LWD frequencies of approximately two pieces per channel width in side channels, and in channels less than 65-feet wide (WFPB 1997). Target LWD frequencies in larger channels are less well documented. LWD generally collects in clusters within larger channels in channels greater than 65-feet wide (Slaney et al. 1997), and is often associated with large key pieces. Approximately 25 percent of the LWD placed in larger channels will be key piece sized (volume $\geq$11 yd^3) if such pieces are available; if individual pieces large enough to function as key pieces are unavailable, LWD will be placed in clusters that have a minimum collective volume of 11 yd^3. LWD must be fir, hemlock, cedar, or spruce. Non-key piece sized logs will have a minimum diameter of 12 inches and be at least 20-feet long. Rootwads will have a diameter of at least 18 inches at the base of the bole, and a stem that is at least 3-feet long. If future studies or monitoring indicate that such LWD clusters are unstable in channels such as the mainstem Green River, LWD may be anchored pending approval of the services and USACE.

5.2.4 Habitat Conservation Measure: HCM 2-04 Standing Timber Retention

HABITAT CONSERVATION MEASURE NUMBER: HCM 2-04

MEASURE: Standing Timber Retention

Tacoma will retain 229 acres of existing standing timber within the new inundation zone of Howard Hanson Reservoir (1,147 feet to 1,167 feet) resulting from additional water storage under Phase I of AWS project. Any lands within the inundation area not under Tacoma or USACE ownership will be acquired by Tacoma prior to construction of the AWS project.

Decay of vegetative material in the newly inundated zone may cause water quality problems in water stored behind HHD for municipal use. Such problems are likely to be the result of the decomposition of grasses and low lying brush

with retained standing timber adding a minor impact. In the event that such conditions are determined likely to occur, Tacoma agrees to take every effort to avoid actions which would be detrimental to the Green River's natural resources as the City meets its responsibility to maintain water quality and protect public health. In the event of potential contamination of the municipal water supply, Tacoma will consult with the USFWS and NMFS to determine a course of action that will minimize impacts to Green River natural resources.

Objective

The objective of this measure is to accelerate the re-establishment of anadromous fish use of the Green River above HHD if acceleration is found to be beneficial.

Rationale and Ecosystem Benefits

The retention of standing timber (166 acres deciduous forest, 48 acres mixed forest, 15 acres conifer forest) in the HHD inundation zone would create standing snags in an area that would not otherwise support live vegetation. The standing snags would maintain wildlife, riparian, and instream habitat through periods of reservoir inundation. In addition, the snags would provide benefits to juvenile salmonid fish in the reservoir, which tend to congregate in near-shore areas (Dilley 1994).

Tacoma believes that low-lying vegetation in the inundation zone (1146 feet-1167 feet) may cause taste and odor problems in water to be stored behind HHD for municipal use. This area contains a large amount of vegetation that would decay in the reservoir and potentially contaminate the City's water supply. This may pose a major problem for Tacoma since the City's operation as an unfiltered, surface water supply depends in large part on its ability to provide the public with water that meets rigorous federal and state water quality standards.

Tacoma will undertake an evaluation of the potential contamination of its water supply from the vegetation in the inundation zone, during the pre-construction engineering and design phase of the HHD-AWSP. This evaluation will consist of hiring a consulting firm or individual knowledgeable in the evaluation of public water supply quality concerns to review this HCM in relation to the operation of HHD and the potential for water quality degradation. If deemed necessary, a course of action to protect the quality of the municipal water supply, while minimizing impacts to fish and wildlife habitats, will be coordinated with the Services prior to implementing the action.

Tacoma will assume all financial responsibility for this measure. There is no monitoring plan developed solely for this habitat conservation measure; however, several proposed monitoring activities associated with other measures would determine fish distributions within different sections of the reservoir, and would likely include portions of these areas (see Chapter 6).

5.2.5 Habitat Conservation Measure: HCM 2-05 Juvenile Salmonid Transport and Release

HABITAT CONSERVATION MEASURE NUMBER: HCM 2-05

MEASURE: Juvenile Salmonid Transport and Release

If supplementation of juvenile salmonids into the upper Green River watershed is determined to be beneficial to Green River fish runs by the NMFS and USFWS, Tacoma will transport and release juvenile salmonids above HHD. This measure does not include the production of juvenile salmonids in an incubation and rearing facility, only the transport and release of fish into the upper watershed. This measure complements the transport and release of adult upstream migrating fish at Tacoma's Headworks, and complements the production of juvenile salmonids at the MIT fish restoration facility.

Objective

The objective of this measure is to provide the opportunity to accelerate the re-establishment of anadromous fish production of the Green River above HHD through the transport and release of juvenile fish.

Rationale and Ecosystem Benefits

Tacoma will partially or wholly fund upstream and downstream fish passage facilities to aid in region-wide efforts to restore anadromous fish production to the upper Green River watershed. These facilities will be instrumental to restoring anadromous fish runs above HHD, but other facilities may also be needed to accelerate restoration. Restoring salmon and steelhead runs in the upper watershed could be initiated by transporting and releasing unmarked adult fish above HHD to distribute and spawn naturally in upper watershed, but the rebuilding of harvestable, self-sustaining runs could take many years. A fish restoration facility could be used to "jump-start" or accelerate the natural rebuilding of anadromous fish runs by producing juvenile salmonids for outplanting into the upper watershed to supplement adult returns.

Although not proposed as part of this conservation measure, Tacoma is committed to funding the development and construction of a fisheries restoration facility that will be owned and operated by the MIT. The facility would be constructed adjacent to the Green River, and would be designed to include incubation and rearing facilities for juvenile salmonids patterned after the NMFS natural rearing program (NATURES). These rearing procedures create a more natural environment (e.g., natural cover, substrate, and structures) to incubate, rear, and acclimate fish in order to achieve improved survival and productivity. The juvenile fish produced at the fish restoration facility would be used to restore and enhance anadromous fish populations in the Green River, and could serve as the primary source for juveniles to be outplanted in the upper Green River watershed.

The fish restoration facility would include the following attributes (FishPro 1995):

- weir, ladder, and trap to capture adult anadromous fish;
- adult holding facilities for 300 steelhead trout, 400 chinook salmon, and 440 coho salmon;
- incubation and rearing facilities for 350,000 steelhead trout, 500,000 chinook salmon, and 500,000 coho salmon; and [2]
- well water stabilization facility or surface water treatment for incubation (depending upon source).

Tacoma will pay up to $8,500,000 for design and construction of the fish restoration facility and will provide the necessary wells, well houses, and water conveyance facilities. Tacoma will pay the MIT $350,000 per year (1995 dollars) for operation and maintenance costs for the life of the facility. Tacoma will also fund up to $675,000 for monitoring and evaluation of the fish restoration facility to provide the basis for long-term watershed restoration.

The transport and release of juvenile salmonids is contingent upon a number of factors, including approval of the fish restoration facility and its intended uses (i.e., restoration and supplementation of anadromous fish populations in the Green River) by fisheries resource agencies, and obtaining the necessary water rights and permits for the facility. If the fish restoration facility cannot be permitted or is deemed to be infeasible, the MIT will elect to either:

[2] The capacity of the fish restoration facility may be increased as a result of ongoing discussions between the MIT and Tacoma.

- accept a lump sum of $12,000,000 into MIT's Fisheries Trust Fund to be used for fisheries enhancement within the Green/Duwamish river system; or
- accept any and all unused funds originally targeted for the fish restoration facility into the MIT Fisheries Trust Fund to be used for fisheries enhancement in the Green/Duwamish river system.

Juvenile salmonids produced from the fish restoration facility could be outplanted into the upper watershed until the number of adult fish returning to the upper watershed (via the Headworks trap-and-haul facility) is determined to be sufficient to establish self-sustaining runs. Supplementation on a short-term basis could reduce the period of time required to reach adult escapement goals. In the case of chinook salmon, which are less likely than steelhead to develop self-sustaining runs, supplementation from the fish restoration facility may also be beneficial for addressing short-term declines in adult escapement due to environmental conditions (e.g., temporary population reductions resulting from poor ocean conditions or several years of drought). If limiting aspects of the chinook salmon life cycle cannot be remedied to achieve self-sustaining runs of adult fish (as indicated by the monitoring programs), then long-term supplementation may be required to restore and maintain the production of this species in the upper watershed.

Determining a management plan to recolonize available habitat above HHD is the responsibility of fisheries management agencies. Allowing only adult returns to seed the upper watershed may be an optimal procedure for developing local adaptations, but it would delay habitat saturation. Outplanting juveniles from the fish restoration facility may provide a means of identifying upper watershed outmigrants, or supplementing adult returns may accelerate the rebuilding process. The decision on when, how, or if to use the fish restoration facility will be decided by MIT and appropriate federal and state fish management agencies. The fish restoration facility, and therefore transport of juvenile salmonids into the upper watershed, would only proceed if supplementation of juvenile fish above HHD is found to be beneficial. Even if the fish restoration facility does not proceed, funding of the MIT Fisheries Trust Fund would still provide benefits to fisheries resources within the Green/Duwamish river system.

Tacoma will fund and support the federal, state, and local permitting process for the fish restoration facility, but the MIT, as owners and operators of the facility, will be the permittees if permitting is found to be necessary. If necessary, permits to comply with the Endangered Species Act (ESA) will be issued to the MIT and will be sought as a process separate from the Tacoma Green River HCP. Funding of the fish restoration facility provides for monitoring and evaluation to provide the basis for long-term

watershed restoration, but details will not be developed until the fish restoration facility proceeds.

5.2.6 Habitat Conservation Measure: HCM 2-06 Low Flow Augmentation

HABITAT CONSERVATION MEASURE NUMBER: HCM 2-06

MEASURE: Low Flow Augmentation

The USACE, with Tacoma sponsorship, will have the option to annually provide up to 5,000 ac-ft of additional summer conservation pool storage in Howard Hanson Reservoir that can be used to augment Green River flows. The actual use of this storage will be determined using an adaptive management approach. Although initially intended to augment minimum flows during drought conditions, there is considerable flexibility in determining the best use of the water for fishery resource benefits. For example, the storage may be used to: 1) augment late spring flows to benefit steelhead incubation; 2) provide flows beneficial to downstream water quality conditions (e.g., temperature control); or 3) provide supplemental freshets during late summer to benefit adult salmon migrating up the Green River. The actual use of up to 5,000 ac-ft of storage will consider the input of the resource managers[3] charged with determining the best application of the water to benefit ecosystem health.

Water stored behind HHD and released for fish conservation purposes shall not be subject to appropriation by Tacoma.

Objective

The objective of this measure is to provide additional water in the Green River during low flow periods that can be used for optimal benefit of fish

Rationale and Ecosystem Benefits

Under drought conditions, low summer flows in the mainstem Green River can reduce the availability and quality of salmonid rearing habitat. In Puget Sound streams, Gibbons et al. (1985) suggested that the amount of available summer rearing habitat, which is established by the level of instream flow, is directly related to the number of returning adult steelhead. Other researchers confirm this relationship stating “the volume of flow in summer determines the carrying capacity of the stream for juvenile salmonids” (Everest et al. 1985). Research over a 14-year period in Bingham Creek, Washington

[3] See footnote No. 3 in HCM 2-02 for description of the Green River Flow Management Committee.

showed that the quantity of water during summer accounted for over 95 percent of the inter-annual variation in smolt production (Parkhurst 1994). Similarly, extensive research has indicated that production of coho salmon in Oregon streams was found to be most strongly correlated with the amount of useable rearing habitat rather than other parameters (Mason and Chapman 1965; Everest et al. 1985).

During non-drought years, incubating steelhead eggs are exposed to a risk of dewatering if river flows drop during June through August. The majority of steelhead in the Green River spawn during the months of April and May, and the eggs incubate for 45 to 65 days extending through July or early August (see Appendix A). If steelhead construct their nests (redds) in the channel margins during April and May when flows in the river are high, the eggs are susceptible to dewatering as the seasonal flows drop during the incubation period. During dry years, river flows are often low during the spawning season and the eggs will remain protected from dewatering by Tacoma's commitment to maintain minimum flows. However, during wet years, the steelhead spawn higher in the channel margins and as flows naturally drop during June and July, the eggs may be dewatered and have poor survival. During wet years, additional protection for steelhead redds may be provided by maintenance of instream flows that are higher than those mandated by the state or by the MIT/TPU Settlement Agreement.

Tacoma is considering implementing this measure through the USACE's Section 1135 Program or as part of the AWS project. The capture and retention of up to an additional 5,000 ac-ft of water will provide supplemental flows that can be used to augment low summer flows during drought conditions, or augment flows during June and July to protect steelhead incubation, or released during late September to aid the upstream migration of adult salmonids. All of these potential uses of an additional 5,000 ac-ft of storage will benefit Green River fishery resources. The actual use of the additional flow will by determined by the NMFS and USFWS in coordination with the USACE and other resource managers.

5.2.7 Habitat Conservation Measure: HCM 2-07 Side Channel Reconnection – Signani Slough

HABITAT CONSERVATION MEASURE NUMBER: HCM 2-07

MEASURE: Side Channel Reconnection – Signani Slough

Tacoma and the USACE will restore and enhance up to 3.4 acres of side channel fish habitat in Signani Slough near RM 60.0. This will be accomplished through: 1) excavation of fill material; 2) replacement of a 48-inch culvert; 3) addition of LWD and

excavation in the floodplain to restore habitat complexity; and 4) diversion of up to 35 cfs flow from the mainstem Green River to provide additional water for the entire channel length. All work will be performed within the historic Green River floodplain. The Headworks road will be breached at two points to provide flow diversion at the upstream end by installing a 2- to-4-foot culvert, and replacing an existing 4-foot HCM culvert (downstream end) with either one or two longer culverts. Flow diversion to the upstream end will require starting 600-1,000 feet upstream of the breach near RM 59.6. The outlet channel may require re-alignment and may extend farther downstream than the current channel. This habitat conservation measure is intended to restore habitats that were impacted by the construction of HHD.

Alternate measures will be implemented if the above measure is determined to be infeasible, or not cost-effective during final design, or if environmentally superior measures can be implemented at comparable cost. Any alternate measures will have habitat benefits greater than or equal to the measure originally proposed, and will be reviewed and approved in advance by the NMFS and USFWS.

Objective

The objective of this measure is to provide additional rearing and holding habitat for salmon and steelhead along the Green River.

Rationale and Ecosystem Benefits

Levees, channel degradation, and controlled flows from HHD have reduced the interaction between floodplains and stream channels in many sections of the Green River (Fuerstenberg et al. 1996). Many areas of the floodplain have been converted to other uses, dramatically reducing the interchange of water and materials between the aquatic and terrestrial systems, and isolating floodplain wetlands. The lower 1,000 feet of Signani Slough, a left bank Green River side channel, was filled, channelized, and disconnected during original construction of HHD and re-alignment of the Burlington Northern Santa Fe Railroad in 1960 and 1961. During construction activities, the channel was filled and temporarily cut off from the Green River, reportedly stranding over 1,000 adult salmon (Signani 1997).

In general, side-channels have been shown to provide important habitat for juvenile and smoltified salmon and steelhead (Sedell et al. 1984; Murphy et al. 1989; Marshall and Britton 1990; Sheng et al. 1990; Bonnell 1991; Cowan 1991). The restoration of Signani Slough would add to the overall quantity and quality of fish habitat in the upper middle Green River, in particular for: 1) adult coho salmon and steelhead, and 2) juvenile chinook, coho salmon, and steelhead. The Signani Slough is the only available off-

channel spawning and rearing habitat of any significance for the middle Green River, from RM 45.0 to RM 70.0. Being partially fed by groundwater, this slough may represent a critical Green River habitat type. The re-connection of Signani Slough would provide approximately 3.4 acres of critical rearing habitat for juvenile salmonids, and may provide spawning habitat for adult salmon and steelhead and nursery areas and feeding stations for newly emerged fry.

5.2.8 Habitat Conservation Measure: HCM 2-08 Downstream Woody Debris Management Program

HABITAT CONSERVATION MEASURE NUMBER: HCM 2-08

MEASURE: Downstream Woody Debris Management Program

Tacoma, working collaboratively with the USACE, MIT, and federal, state, and local agencies will develop and implement a woody debris management program designed to pass wood that collects behind HHD downstream to the middle and lower Green River (below Tacoma Headworks). As part of their HHD maintenance operations, the USACE collects woody debris that enters the HHD reservoir and disposes of the wood by burning or transporting it off-site. For this measure, all of the Large Woody Debris (LWD) and a portion of the small woody debris that enters the HHD reservoir and is collected by the USACE as part of debris removal operations will be used for ecosystem rehabilitation efforts. The actual volume of wood that will be available for rehabilitation efforts will vary, depending on source material available within the HHD reservoir pool. The wood debris management program may be modified by agreement of signatories to the Incidental Take Permit.

Large Woody Debris (LWD)

Following construction of the AWS project, Tacoma, working with the USACE, will allocate [4] for passage downstream of Tacoma's Headworks at least half of the LWD that is collected by the USACE behind HHD. **The size distribution of wood passed or placed below the Headworks shall be approximately the same as that wood entering the reservoir, and will include the largest sizes available. If monitoring indicates that the large wood is too small to be naturally retained, then the proportion of the largest size class will be increased.** ~~Wood allocated for transport downstream of Tacoma's Headworks will be representative of the size, species, and~~

[4] **Large Woody Debris pieces will be considered allocated if one of the following conditions are met: 1) a permit has been submitted for a project: 2) a project design is being developed; or 3) an entity has made a request for the wood for use in a project in the Green River basin. Large woody debris pieces that remain unused because of the lodging or filling of an appeal or litigation in any forum that has the potential to interfere with the placement of wood under this section shall be considered allocated.**

~~age of wood collected by the USACE behind HHD.~~ If more than ten pieces of LWD are available in any given year, 50 percent of the total number of pieces collected will be allocated for downstream passage. If less than 10 pieces of LWD are available in any given year, all LWD pieces will be allocated to downstream passage. If an unusually large volume of wood is collected in any given year, such as contributions from a major landslide, Tacoma reserves the option to reduce the amount of LWD collected, stored, and transported contingent on written approval by the Services. The approximate size criteria of the LWD that will be used are as follows: logs will have an average diameter of at least 12 inches at the largest end or bole above the rootwad if attached and will be at least 12 feet long; rootwads will have a minimum diameter of 48 inches with or without the basal trunk.

Large woody debris collected by the USACE will be temporarily stored for up to three years. At an average frequency of every other year, the LWD allocated for passage downstream will be re-loaded and trucked below the Headworks on existing roads. It is anticipated that LWD will be introduced at several locations within the active channel of the Green River prior to winter high flows. The LWD will then be allowed to distribute naturally within the river as flow and the natural transport capacity increase.

In addition to, or as an alternative to placing unanchored LWD downstream of the Headworks, select pieces of LWD may be anchored in the river, rather than allowing flows to distribute the pieces naturally. In this case, the locations and methods for anchoring LWD are downstream of the Headworks will be determined in coordination with MIT, and federal, state and local agencies with jurisdiction over habitat protection and river management. If LWD is anchored, fewer pieces may be added to the river to ensure implementation costs remain comparable to those for placing unanchored LWD.

Following construction of the AWS project, any LWD collected from the reservoir and not allocated for downstream transport below the Tacoma Headworks will be stored and used for other conservation measures identified in this HCP. Once the LWD requirements for those conservation measures have been fulfilled, any remaining LWD will be allocated for use in other USACE sponsored rehabilitation projects in the Green River basin or offered to tribal; federal, state, or local agencies; or non-profit organizations for use in habitat rehabilitation projects elsewhere in the Green River basin. If sufficient pieces of LWD are available to meet short-term needs for ecosystem rehabilitation projects, select pieces of LWD will be made available for cultural use by the Muckleshoot Indian Tribe. If the LWD remains **unallocated** ~~nutilized~~ following three years of storage, and provided inter-basin contamination issues **can be** adequately addressed, **and provided that the LWD pieces in storage are decaying to an extent that if not used, the LWD pieces will become unusable for ecosystem rehabilitation or habitat projects unallocated** ~~unutilized~~ LWD pieces will be made available for ecosystem rehabilitation projects outside of the Green River basin. If any LWD remains unutilized after five years of storage, Tacoma will use best available efforts to utilize remaining LWD for regional ecosystem rehabilitation efforts.

Small Woody Debris

In addition to the LWD, five trash-truck loads (total 50-75 tons) of small woody debris (if available) will be transported to placement sites downstream of the Tacoma Headworks at an average placement frequency of every other year. The actual volume of small woody debris that will be collected, transported, and introduced into the lower river will vary, depending on source material available within the HHD reservoir pool. Small woody debris will consist of small logs, branches, and other wood fragments with an average diameter of less than 12 inches. **If five trash-truck loads are not available, then Tacoma will transport the available quantity.**

Funding

In addition to costs allocated for the storage and transport of wood for unanchored placement downstream of Tacoma Headworks, a sum of $5,000 will be annually allocated for anchored LWD placement. If not used in any given year, these funds will be carried over to subsequent years to build up a funding bank for future LWD anchoring projects. The volume of woody debris transported downstream can be adjusted predicated on an evaluation of the volume of wood that will effectively contribute to natural stream processes, public health and safety, and flood control impacts. Monitoring activities associated with this measure are described in Chapter 6.

Tacoma will work with the MIT, federal, state, and local agencies with jurisdiction to select wood placement locations. If recommendations for LWD placement require alternate placement procedures such as anchoring, the quantity of LWD placed may be reduced to ensure costs remain comparable. If problematic LWD accumulations in the middle or lower river are identified (as determined by the NMFS and USFWS), the rate of placement may be reduced and funds reallocated to other habitat restoration measures. If monitoring indicates that an increased rate of LWD placement would be beneficial, funds for additional wood transport and placement must come from other sources.

Objective

The objective of this measure is to increase the amount of LWD in the Green River below the Tacoma Headworks Dam, where it has been reduced by timber harvest, construction of HHD, and active removal from the river.

Rationale and Ecosystem Benefits

Woody debris are perhaps the most important link between the aquatic and terrestrial environments. Woody debris interacts with other natural processes (i.e., climate, hydrology, and erosion) to create food, cover, and microclimates suitable for virtually all species of juvenile salmonids at some point during their maturation (Chapman 1966; Murphy et al. 1984; Bjornn and Reiser 1991; Swanston 1991). In the Pacific Northwest,

current breaks providing velocity shelter, summer/winter rearing habitat for juvenile salmonids, and spawning gravels for adult salmonids often form in the presence of woody debris (Sedell et al. 1984; Dolloff 1987; Shirvell 1990; Fransen et al. 1993; Peters et al. 1993; Rodgers et al. 1993; Hartman et al. 1996; Fausch and Northcote 1992; Crispin et al. 1993; Cederholm et al. 1997a). The deposition of key woody debris pieces also initiates pool formation (Beechie and Sibley 1997); prompts bar, island, and side channel formation (Sedell et al. 1984; Abbe and Montgomery 1996); stores sediment (Lisle 1986; Keller et al. 1995); retains organic matter (Bilby and Likens 1980); and affects bedload transport mechanics (Smith et al. 1993).

Woody debris also exerts a significant influence on the productivity of Pacific Northwest streams. Woody debris are important in retaining organic matter in fluvial systems that will later be processed by aquatic macroinvertebrates and converted to fish production (Bilby and Likens 1980). Key woody debris pieces traps smaller woody pieces, until a framework is built. Coarse particulate matter collects on the framework and is refined by bacteria and fungi into food for macroinvertebrates. Macroinvertebrates, in turn, are an important food source for salmonid fishes.

Lateral habitats containing large woody debris are regularly associated with high juvenile salmonid production rates. Peterson and Reid (1984) found that 15 of 17 (88 percent) wall base channels in the Clearwater River, Washington were used by juvenile coho and estimated that, annually, 20 to 25 percent of the total smolt yield in the Clearwater River comes from wallbase channel habitat. Some groundwater-fed side channels in British Columbia produce more than one coho smolt per square foot of habitat area (Sheng et al. 1990), by comparison, coastal British Columbia streams produce approximately 0.3 smolts per square foot (Marshall and Britton 1990). Approximately 16,000 juvenile coho salmon overwintered in a side channel in the upper Squamish River, British Columbia (Sheng et al. 1990). Juvenile chum salmon also utilize side channel areas for rearing habitat (Sheng et al. 1990; Bonnell 1991; Cowan 1991), however their freshwater residency is usually limited to 30 days or less (Salo 1991). The density of juvenile chinook using off channel habitat in the Taku River, Alaska increased in November, indicating movement into overwinter habitat (Murphy et al. 1989). Everest and Chapman (1972) found post-emergent chinook in Idaho seek backwater habitats, almost exclusively, during spring freshets. Chinook fry are also known to use quiet, shallow waters soon after emergence in the Green River (Jeanes and Hilgert 1999). Off channel rearing has also been documented for rainbow trout (Everest et al. 1987; Sheng et al. 1990; Hartman et al. 1996), bull trout (Goetz 1994), and cutthroat trout (Sedell et al. 1984; Hartman et al. 1996).

Woody debris is recruited to the stream system in a number of ways. On large, unconfined rivers, lateral migration of the stream channel undercut banks, delivering whole trees with attached rootwads to the channel (Robison and Beschta 1990). Other sources of woody debris recruitment include landslides, windthrow, and floods. Most (83 percent) of the hardwood woody debris pieces originate within 33 feet of the stream margin as compared to only 53 percent of coniferous woody debris pieces (McDade et al. 1990). This discrepancy is often attributed to the size differences between the two woody debris types.

Once in the stream, most pieces smaller than the bankfull width of the channel are transported considerable distances downstream. The narrow straight reaches of a river are generally considered source reaches, while lower gradient valley floors serve as woody debris traps (Murphy and Koski 1989). In large rivers, the number of woody debris jams are fewer, but individual pieces and jams are usually larger, and often cause secondary channels to form (Sedell et al. 1984). Recently recruited woody debris usually comprises the majority of wood in Pacific Northwest streams (Hyatt 1998). For example, most of the woody debris in the Queets River was depleted within the first five decades of its deposition; however, a few pieces were over 1,000 years old (Hyatt 1998). Older pieces are often found exposed in gravel bars, where they may remain buried beneath alluvial deposits in anaerobic conditions for many years before being exhumed by high flow events. In contrast, recently recruited debris is often found entangled in debris jams.

The deterioration of freshwater habitat is listed as a contributor in the decline of may anadromous fish species, and in many cases that deterioration is linked to loss of large woody debris (Nehlsen et al. 1991; Weitkamp 1995; Myers et al. 1998). Most alluvial rivers in the Pacific Northwest formerly contained extensive debris jams. Historically, the Skagit River had a debris jam that measured almost 0.75 miles in length and over 1,300 feet wide (Sedell and Luchessa 1982). The Nooksack and Stillaguamish rivers were also choked with debris jams over their lower reaches (Sedell and Luchessa 1982). In 1906, a large logjam on the Puyallup River between Orilla and Kent, Washington, caused major flooding on both the Green and White rivers (Fuerstenberg et al. 1996).

Historically, the middle Green River probably supported much higher frequencies of debris jams. However, the source of woody debris has been reduced drastically through a series of dikes, conversion of forested floodplains to agricultural land uses, and the addition of Howard Hanson Dam. Howard Hanson Dam was constructed at the confluence of the three largest tributaries in the upper Green River basin. Prior to

creation of the reservoir, these tributaries carried large volumes of LWD downstream to lower reaches of the Green River. Since creation and operation of the dam and reservoir, normal river transport of wood has been disrupted, as all pieces of wood are either collected and disposed of (via burning or transport and use off-site), or are stranded at higher elevations following a flood pool rise. As recent as 1994, a survey indicated that only 29.6 pieces of woody debris were available per stream mile in the middle Green River downstream of Howard Hanson Dam (Fuerstenberg et al. 1996).

Under current conditions, woody debris in the middle Green River (Flaming Geyser State Park downstream to Auburn, Washington) is often closely associated with lateral areas of the mainstem and off-channel habitats (e.g., side channels, sloughs, gravel bar pools, and beaver ponds). In many instances, debris accumulations divert water into side channels. At RM 45.5, the Green River exits the gorge area near Flaming Geyser State Park and enters a broad valley, characterized by a decrease in gradient and deposition of gravel (Perkins 1993). This broad river valley provides the perfect conditions for the accumulation of woody debris and formation of lateral or side channel habitat (Sedell et al. 1984; Hyatt 1998).

Many habitat rehabilitation projects occurring in the Pacific Northwest include the placement of woody debris in streams (Cederholm et al. 1997b). Among the most common structures used in larger rivers include: log deflectors facing downstream, channel margin log-boulder accumulations, angle logs, boulder-rootwad complexes, trees anchored to the streambank, trees with attached stem cabled to boulders, boulder-wood debris complexes, divide logs situated within boulder weirs. The physical and biological design specifications along with a thorough understanding of the geomorphic processes are imperative to maximize the benefits of projects of this nature (Cederholm et al. 1997b).

This conservation measure provides a means for restoring recruitment of LWD from the upper to middle and lower reaches of the Green River. In addition to providing in-channel rearing habitat for juvenile salmonids (Fuerstenberg et al. 1996), the release of LWD should interact with the restoration of the Signani Slough and other habitat rehabilitation projects to improve the overall quality of instream habitat in the Green River below the Headworks. By guaranteeing that at least half of the wood delivered to Howard Hanson Reservoir is passed downstream of the Headworks and either allowed to distribute freely or placed in the channel using techniques such as those described above, Tacoma expects to substantially increase the amount of functional LWD in the Middle Green River.

Large woody debris delivered to the reservoir is collected in log booms that are approximately 1 acre in size. Approximately 2 to 7 acres (about 100 to 150 tons) of wood are collected annually (Olson 1999). The actual amount collected varies widely since LWD input and transport are episodic in nature, and tends to be highest in years with major flood events. If more than ten pieces are collected in any year, fifty percent of the pieces collected will be made available for other habitat restoration projects. If allowed to freely distribute, LWD allocated for downstream passage will be input at least every second year. If it is determined that anchoring individual pieces or groups of LWD is the preferred means of restoring LWD to the river, the wood may be stored for up to five years and then input all at once, to maximize construction efficiency and cost effectiveness.

Large and small woody debris placed in the river from subsequent distribution by high flows will be input on exposed gravel bars within the active channel during low flows. Specific locations chosen for in-channel LWD placement will be identified in coordination with the Services, USACE, MIT, and King County. Placement locations must be accessible to trucks and heavy equipment and must not require crossing of wetted channels or unstable banks. The number of placement locations will vary depending on the amount of wood to be placed in any given year.

LWD must be greater than 9 m^3 by volume (24 inches in diameter and over 100 feet long) to be considered a stable, key piece in such channels (NWIFC 1997). The Green River is a wide, high energy stream channel. Hardwood species (alder or cottonwood) generally decay more rapidly and are less durable than conifers. Therefore only LWD from coniferous species including fir, hemlock, cedar, or spruce will be used for anchoring projects in the mainstem Green River. In addition, LWD anchored in the channel will have a volume of least 11 yd^3, or will be installed in groups that have a collective volume of 11 yd^3, which is consistent with the minimum key piece size for larger rivers (WFPB 1997). The total volume may consist of a single piece with an average diameter of 24 inches that is at least 105 feet long, shorter pieces with larger diameters (NWIFC 1997), or a group of smaller pieces with a collective volume of at least 11 yd^3. Other design criteria (orientation, anchoring method) will be determined in coordination with the Services on a site specific basis.

5.2.9 Habitat Conservation Measure: HCM 2-09 Mainstem Gravel Nourishment

HABITAT CONSERVATION MEASURE NUMBER: HCM 2-09

MEASURE: Mainstem Gravel Nourishment

Tacoma and the USACE will provide annual funding sufficient to place up to 3,900 yd^3 of screened gravel suitable for use by spawning salmonids within the mainstem Green River between RM 64.5 and RM 32.8. **The amount of screened gravel to be placed each year will be approximately 3,900 cubic yards, but not exceed 3,900 yards. The amount of gravel to be placed will be reduced only: 1) at the specific request of the Services; or 2) if the preferred placement strategy calls for placement of a lesser amount of gravel in conjunction with construction of structures deliberately designed and placed to retain gravel; independent of the placement of wood under HCM 2-08.** Preliminary analyses indicate that the middle Green River just below the Green River Gorge near RM 45.0 is the preferred placement site (USACE 1998). Should Green River restoration efforts by other parties place gravel in the RM 45.0 area, the USACE/Tacoma gravel nourishment site will be switched to an area immediately below Tacoma's Headworks at RM 61.0 If deemed beneficial by the Services, gravel may be placed between HHD (RM 64.5) and Tacoma's Headworks. Gravel will be transported by truck and placed (with front-end loader or back-hoe) just within the active channel to be subsequently transported and distributed during high flow conditions. Actual sites for placement of the gravel will be selected based on river access. This program is focused on augmenting the supply of gravel within the middle Green River.

Should high flows be insufficient to redistribute all of the gravel placed in a given year, subsequent annual placements may be shifted to the reach between the Headworks and the Green River gorge or between HHD and Tacoma Headworks, conditional upon approval by the Services. One alternative would be to place the entire annual increment just downstream of the Headworks as described above. Another option would be to install **gravel retention structures** ~~boulder weirs~~ at selected locations to facilitate gravel storage in this high energy reach. Actual placement strategies will be modified based on the results of monitoring.

Tacoma will work with the MIT, federal, state, and local agencies with jurisdiction to select gravel placement locations. If recommendations for gravel nourishment require alternate placement procedures, the quantity of gravel may be reduced to ensure costs remain comparable. If problematic gravel aggradation in the lower river is identified (as determined by the NMFS and USFWS), the rate of placement may be reduced and funds reallocated to other habitat restoration measures. If monitoring indicates that an increased rate of gravel nourishment would be beneficial, funds for additional gravel must come from other sources. Changes in the volume or location of placement sites will require approval by the Services and written notification to WDFW, MIT, King County, and the USACE.

Objective

The objective of this measure is to increase the amount of spawning gravel in the mainstem Green River below the Tacoma Headworks Dam, where it has been reduced by construction of HHD.

Rationale and Ecosystem Benefits

Studies have shown that the existing supply of gravel within the mainstem river is being influenced by the operation of HHD, resulting in changes in channel morphology and in bed armoring (Perkins 1993; Dunne and Dietrich 1978). In addition, HHD essentially captures all gravel that may be recruited from the upper watershed, thereby precluding the natural replenishment of spawning gravel to segments of the river below the dam. Over time, this will ultimately result in the gradual degradation of suitable spawning habitats in the mainstem river, thereby reducing the anadromous fish production potential. Other concerns relate to the perching (disconnection) of off-channel habitats from the mainstem as channel downcutting occurs and the bed becomes armored. King County researchers have documented a loss of suitable-sized spawning gravel with resultant bed armoring from below HHD (RM 64.5) to below Flaming Geyser State Park (~RM 45.0) (Perkins 1993). This armoring layer is estimated to be advancing downstream at the rate of 700 to 900 feet per year.

As noted in the AWS project DFR/DEIS, Appendix F1, Section 4B: gravel nourishment in the middle and upper Green River (USACE 1998), the 3,900 cubic yards of gravel to be distributed to one or more sites in the river, is intended to maintain “an increment” of existing spawning habitat in the middle Green River. The objective of gravel nourishment is to slow or stop the downstream extension of streambed armoring and to replenish certain areas currently deficient in spawning-sized sediments. Preliminary analysis suggests that gravel of a size suitable for use by spawning salmonids would have a short residence time in the channel upstream of Kanasket State Park (USACE 1998), therefore, the reach immediately downstream of the gorge was identified as the preferred placement site. The extent to which gravel nourishment successfully stops continued streambed armoring would be identified through monitoring and evaluation. A major concern, voiced by the USACE, of adding gravel-sized sediments to the middle Green River, is the potential effect on flood control measures in the lower river. As described in Chapter 6, a monitoring plan is proposed to minimize the risk of problematic aggradation downstream of gravel placement sites.

The ecosystem restoration aspects of the AWS project are capped by financial constraints under federal authorization Section 216. If problematic gravel aggradation in the lower

river is identified, the rate of gravel nourishment may be reduced. If monitoring identifies the value of an increased rate of gravel nourishment, funds for additional gravel must come from other sources. The responsibilities of the USACE for the effects of HHD operations under the ESA have not yet been identified **through formal Section 7 consultation, and additional gravel nourishment may be a Section 7 requirement**. The Green/Duwamish River Basin Ecosystem Restoration Study sponsored by the USACE and King County is **also considering placement of gravel in the Green River.** ~~a possible source for additional funding.~~

5.2.10 Habitat Conservation Measure: HCM 2-10 Headwater Stream Rehabilitation

HABITAT CONSERVATION MEASURE NUMBER: HCM 2-10

MEASURE: Headwater Stream Rehabilitation

Tacoma will contribute funds to rehabilitate a portion of the habitat lost by construction of Howard Hanson Dam and inundation of the existing pool. Project numbers assigned to each activity by the USACE are listed in parentheses. Projects **currently expected** to be funded by Tacoma **as part of the AWS project** under HCM 2-10 include:

Mainstem and Valley Floor Habitat Rehabilitation (MS-03). This project will rehabilitate habitat in approximately 8,000 feet of channel between RM 69 and RM 72 (elevation 1,177-1240 feet MSL), just upstream of the new inundation zone. Boulders will be placed along the thalweg, and LWD will be embedded in the banks or anchored to placed boulders. Relict side channels or beaded ponds will be excavated within the floodplain to increase the quantity of off-channel habitat, and LWD will be placed to improve the quality of newly excavated habitat features.

Tributary Habitat Rehabilitation (TR06; TR07). These projects will rehabilitate habitat between 1,177 feet MSL and 1,240 feet MSL in the North Fork Green River, Charley, Gale, McDonald, Cottonwood, Piling and three unnamed tributaries. Large woody debris and boulders will be placed in approximately 14,000 feet of channel. Relict side channels or beaded ponds will be excavated within the floodplain of larger tributaries to increase the quantity of off-channel habitat, and LWD will be placed to improve the quality of newly excavated habitat features.

The final design of these conservation measures will be developed during the pre-construction engineering and design phase of the AWS project. Large woody debris frequency and size requirements appropriate for the channel type will be determined using habitat criteria such as those recommended by the Washington Watershed Analysis Manual (WFPB 1997) or comparable systems approved by the Services.

Alternate measures will be implemented if any of the above measures are determined to be infeasible or not cost-effective**, or if environmentally superior measures can**

be implemented at a comparable cost ~~during the final design~~. Any alternate measures will have habitat benefits greater than or equal to the measure originally proposed, and will be reviewed and approved in advance by NMFS and USFWS.

Objective

The objective of this measure will be to rehabilitate and/or enhance fisheries habitat in the Green River and selected tributaries above HHD.

Rationale and Ecosystem Benefits

The construction of HHD resulted in the inundation of several miles of mainstem and tributary habitat. The primary objective of projects identified in this measure is to mitigate for a portion of that lost riverine habitat by rehabilitating habitat in several important tributary streams in the upper watershed. Surveys of the mainstem Green River, North Fork Green River, Charley and Gale creeks in 1991 reported that LWD frequencies ranged from 1.2 to 47.6 pieces of LWD per 1000 feet (USFWS 1992). This generally corresponds with the low end of the range of LWD frequencies (9 to 140 pieces/1,000 feet) reported by Peterson et al. (1992) for comparable large streams (>75 feet BFW) flowing through undisturbed forests. LWD frequencies in the smaller tributaries (Cottonwood and Piling creeks, and three unnamed tributaries) were higher, ranging from 26.9 to 179 pieces per 1,000 feet (USFWS 1992). However, the LWD frequency in those smaller tributaries is generally much lower than the 122 to 244 pieces per 1,000 feet reported for comparable medium size streams (15 to 32 feet BFW) flowing through undisturbed forests (Peterson et al. 1992). The riparian prescriptions to be implemented under this HCP are expected to eventually provide higher levels of LWD recruitment once stream adjacent stands of timber mature. This conservation measure will provide immediate benefits in the form of increased instream structure, and is expected to improve juvenile salmonid rearing habitat and potentially increase spawning habitat for adult steelhead or salmon.

The existing LWD frequency is currently less than the 2 pieces per channel width recommended for channels with “good” habitat conditions (WFPB 1997) in the majority of channels surveyed. Placement of LWD at an average rate of 40 pieces per 1,000 feet is expected to increase the LWD frequency to more than 2 pieces per channel width in all of the treated segments. Addition of large boulders at a rate of 30 boulders per 1,000 linear feet will further increase channel complexity, and will provide stable obstructions to help retain both naturally recruited and placed LWD. Construction of beaded ponds and side channels increase the availability of off channel habitats that are utilized for spawning and rearing by most salmonid species. The addition of LWD and creation of

off-channel habitat just upstream of the inundation zone is expected to increase the amount of available instream juvenile rearing habitat, and to potentially increase spawning habitat for adult steelhead or salmon released above HHD.

The final design of these projects will be developed during the pre-construction engineering and design phase of the AWS project. Alternate measures will be implemented if any of the above projects are determined to be infeasible or not cost-effective during the final design. Any alternate projects will have habitat benefits greater than or equal to the measure originally proposed, and will be reviewed and approved in advance by NMFS and USFWS.

5.2.11 Habitat Conservation Measure: HCM 2-11 Snowpack and Precipitation Monitoring

HABITAT CONSERVATION MEASURE NUMBER: HCM 2-11

MEASURE: Snowpack and Precipitation Monitoring

Tacoma will provide funding to assist the USACE with the installation of three snowpack and precipitation monitoring stations in the upper Green River basin. Unless superior technology becomes available at a comparable cost, snowpack and precipitation monitoring stations will consist of the standard equipment installed by the Natural Resource Conservation Service at their Snowpack Telemetry (SNOTEL) stations. Continuous snowpack monitoring will be accomplished by installing snow pillows within 1,000-foot elevation bands (2,500 to 3,500 feet MSL; 3,500-4,500 feet MSL; and 4,500 to 5,500 feet MSL). Snow pillows are fluid-filled pillows in which fluid pressure responds to the weight of snow that is lying on top of the pillow. The pressure of the fluid in the pillow is measured with a manometer or pressure transducer that is interfaced with a digital data recording and transmission system. In addition to monitoring the snowpack, each site will also be equipped with a rain gage and instruments that measure air temperature and snow depth. Data will be collected from the snow pillows on an hourly basis by the Natural Resource Conservation Service, and provided to the USACE for incorporation into their streamflow forecasting procedures. The snow pillows will be monitored using a continuous data recorder, and data will be transmitted to the Natural Resource Conservation Service Centralized Forecasting System using meteorburst telemetry. Manual snow surveys will be conducted at each new SNOTEL site for the first two years of operation to verify the reliability of telemetered data. The number of snowpack and precipitation monitoring stations may be reduced if the Natural Resource Conservation Service determines that additional sites do not improve the ability of the USACE to forecast spring and summer flows in the mainstem Green River. Less than three SNOTEL stations may also be installed if technology becomes available that will provide a comparable level of run-off forecasting with fewer than three additional sites.

Alternate measures will be implemented if any of the above measures are determined to be infeasible, or not cost-effective during final design, or if superior measures can be implemented at comparable cost. Any alternate measures will have benefits greater than or equal to the measure originally proposed, and will be reviewed and approved in advance by the NMFS and USFWS.

Objective

The objective of this measure is to improve the ability of the USACE to predict stream flows in the Green River.

Rationale and Ecosystem Benefits

Precipitation that falls as snow is temporarily stored in the snowpack during the winter, thus estimates of runoff can be made well in advance of its occurrence. Forecasts of runoff are based primarily on measurements of precipitation, snow water equivalent, and seasonal runoff to date. Water supply forecasting for the Green River basin is currently the responsibility of the USACE, and is used to guide flood control operations, reservoir refill, and the summer flow release schedule. The USACE currently relies on a combination of data obtained from: 1) six snow courses within the Green River basin that are surveyed monthly between January and May; 2) daily telemetry data (obtained between 1 November and 1 July) from five existing SNOTEL sites, only one of which is located within the Green River basin; and 3) temperature and precipitation data from Howard Hanson Dam. The USACE have developed regression equations for 1 March, 1 April, and 1 May to predict spring runoff based on the amount of snow on the ground and year-to-date rainfall. Forecasts produced using the existing models and data network are accurate to within 25,000 ac-ft over the period of April through July.

Runoff forecasts become more accurate as more of the parameters affecting runoff are measured directly within the basin of interest. Rain and snowfall may vary widely with elevation, snow depth, snow water equivalent, snowpack condition, and melt rates are influenced by elevation, aspect and vegetation cover. Additional snow pillows installed at higher and lower elevations within the upper Green River basin will provide data that are more representative of conditions throughout the basin than SNOTEL sites outside of the basin. The availability of additional data on actual basin snowpack conditions, and daily and hourly precipitation and air temperatures throughout the flood season will enhance the ability to predict and respond to flood events during the fall and winter (Murphy 1999). The availability of local, near real-time snowpack data has been shown to improve correlations between actual and predicted runoff from 0.45 to 0.90 (Moore 1998).

The availability of continuous data from the upper Green River basin will also facilitate more frequent spring runoff forecasts, and increase the accuracy of long-term spring runoff predictions. Currently, April through July runoff forecasts based on data derived from the snow course surveys and rainfall are made on 1 March, 1 April, and 1 May. SNOTEL sites within the Green River basin would make mid-month spring runoff forecasts possible. Mid-month spring runoff forecasts would be particularly helpful during years when an early start to refill is necessary (Murphy 1999). More accurate predictions will allow the Green River Flow Management Committee more flexibility in designing a spring refill and summer release program that minimizes impacts to downstream resources while meeting water storage requirements for municipal use and summer instream flow augmentation.

SNOTEL sites funded by other resource management agencies or data users are installed and maintained by Natural Resource Conservation Service personnel. The Natural Resource Conservation Service recommends, and may assist with, manual snow surveys at the snow pillow site during the first two years following installation (Pattee 1999). Manual monthly surveys are used to evaluate the reliability of the telemetered data and identify any site characteristics (e.g., overhanging trees, drainage, deposition patterns on the pillow surface) that may need to be adjusted. Annual maintenance visits will be conducted by Natural Resource Conservation Service personnel during the summer to drain the precipitation gage, replace the antifreeze solution and conduct an electronic analysis of the data logger and other system components.

Snow pillows are currently the most common means of collecting continuous snowpack data from remote measurement sites. However, snow pillow data may be off by 10 percent or more due to bridging of compact snow around the edges of the pillow (Gibbs 1999). Improved technologies are under development (Gibbs 1999). If more accurate snowpack or precipitation monitoring devices become available at a comparable cost, Tacoma may modify the proposed snowpack and precipitation monitoring system, in coordination with the USACE and Natural Resource Conservation Service. If alternative technologies are utilized, Tacoma will notify the Services and provide a description of the alternative systems prior to their installation.

5.3 Habitat Conservation Measures – Type 3

Habitat conservation measures defined as Type 3 are designed to offset Tacoma activities not associated with the operation of Tacoma's water supply system on the Green River, but that have been proposed as a mitigation activity within the HCP area (Green River floodplain).

5.3.1 Habitat Conservation Measure: HCM 3-01 Upland Forest Management Measures

UPLAND FOREST MANAGEMENT MEASURES

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01A

MEASURE: Forest Management Zones

Tacoma will manage lands within the HCP Area above the Headworks (Upper HCP Area) according to one of three designations: Natural Zone, Conservation Zone, and Commercial Zone. Zone designations for existing lands in the Upper HCP Area will be as shown in Figure 5-4. Zone designations for lands added to the Upper HCP Area in the future will be made by Tacoma, in coordination with the WDFW, USFWS, and NMFS. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to designate management zones in the upper Green River watershed that are consistent with maintenance of water quality and protection of fish and wildlife habitat.

Rationale and Ecosystem Benefits

Tacoma owns and manages approximately 14,888 acres in the upper Green River watershed. These lands are managed to: 1) protect water quality; 2) provide habitat for fish and wildlife; and 3) generate revenues through the limited harvest of timber to fund the overall land management program and finance the acquisition of additional lands in the watershed (Ryan 1996). The protection of water quality is the primary management objective throughout the watershed, but varying amounts of active management can occur to meet the other two objectives without compromising water quality. The amount of management that can occur in a given area without negatively impacting water quality is largely a function of proximity to surface water, particularly to the mainstem Green River and its major tributaries. To account for these site-specific differences in the level of concern for water quality, the ownership has been divided into three management zones (Natural, Conservation, and Commercial) and management measures have been developed specific to each zone. Those management measures with relevance to fish and wildlife habitat have been incorporated into this HCP. As additional lands are acquired

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Figure 5-4. Tacoma City Water Green River watershed forest management zones.

BACK PAGE OF AN 11 BY 17 FOLDOUT MAP.]

by Tacoma in the future and added to the HCP (in accordance with provisions of the Implementation Agreement), Tacoma and the Federal Services will review the newly acquired lands and place them into the management zone that is most consistent with the three objectives stated above (i.e., water quality, habitat, and timber revenues, in order of priority).

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01B

MEASURE: Natural Zone

Tacoma will conduct no timber harvesting in those portions of the Upper HCP Area designated as Natural Zone, except to modify fish or wildlife habitat (with prior review by WDFW, and written approval of the USFWS and NMFS) or to remove danger trees within 150 feet of roads. This zone contains 5,850 acres. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to identify and appropriately manage these lands in the upper Green River watershed most important to the maintenance of surface water quality.

Rationale and Ecosystem Benefits

The Natural Zone encompasses lowlands directly adjacent to the Green River, Howard Hanson Reservoir, other lakes, and major tributary streams, where intensive forest practices could have a negative impact on water quality. This zone extends upland from the ordinary highwater mark of these waterbodies for a minimum of 200 feet, or until encountering a property boundary or major physical boundary (e.g., road or powerline right-of-way). The Natural Zone also includes two large blocks of upland mid-successional forest (80 to 90 years old) considered important to spotted owl conservation in the region. Management in the Natural Zone will be directed at preserving the health and vigor of the vegetative cover to reduce erosion and provide habitat for fish and wildlife. The long-term goal for the zone is to let forest stands develop into late-seral conditions through natural forest succession. No timber harvesting will occur in the Natural Zone, except for the selective removal of danger trees within 150 feet of roads, and harvest activities specifically conducted to improve habitat for one or more fish or wildlife species. If these do occur, they will be reviewed by the WDFW and Services, and approved in advance by the Federal Services to ensure they are consistent with this HCP.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01C

MEASURE: Conservation Zone

Tacoma will conduct no even-aged harvesting in conifer-dominated stands (> 50 percent conifer species by basal area) in the Conservation Zone, and no harvesting of any kind (except selective removal of danger trees within 150 feet of roads and habitat modification that complies with snag, green recruitment tree and log retention standards in Measures HCM 3-01F and 3-01G) in conifer-dominated stands over 100 years old in the Conservation Zone (where stand age is determined as the average age of dominant and codominant trees). Any habitat modification in conifer dominated stands over 100 years old will be reviewed by the WDFW and approved in advance by the USFWS and NMFS. Tacoma may conduct uneven-aged harvesting in conifer-dominated stands less than 100 years old for the purpose of accelerating and/or enhancing the development of late-seral forest conditions. When conducting uneven-aged harvesting, Tacoma will leave a minimum of 50 healthy dominant or co-dominant conifers per acre (where available) dispersed across the harvest unit, and individual openings of no more than 10 acres. Green recruitment trees left to meet the requirements of snag and green recruitment tree retention will count toward the 50 trees left to meet this measure. Tacoma will conduct uneven-aged harvesting on an average of no more than 2 percent of the conifer-dominated stands in the Conservation Zone per year, averaged over the term of the HCP, unless a higher rate of harvest is necessary to meet fish and wildlife habitat or water quality goals reviewed by WDFW and approved by USFWS and NMFS. The maximum size of uneven-aged harvest units will be 120 acres. This zone contains 5,180 acres. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to identify and appropriately manage lands in the upper Green River watershed where active manipulation of the vegetation (including logging) can be used to improve habitat for fish and wildlife.

Rationale and Ecosystem Benefits

The Conservation Zone lies directly upland of the Natural Zone and includes a number of forested lands, powerline rights-of-way, open fields, rock outcrops, and wetlands. The long-term goal for the Conservation Zone is similar to the Natural Zone (maintenance of late seral-forest), but a wider range of management tools is allowed in the Conservation Zone because of reduced sensitivity to potential water quality impacts from forest practices. No timber harvesting (except selective removal of danger trees within 150 feet of roads and habitat improvements) will occur in late-seral forest stands (those over 100 years old), and only uneven-aged harvesting methods will be used in younger coniferous

forest stands. There will be no clearcutting larger than 10 acres in young coniferous stands, and uneven-aged harvesting will be done only for the purpose of accelerating the development of late-seral conditions. Once conifer stands in the Conservation Zone reach an age of 100 years, there will be no further harvesting other than selective removal (or topping when it is safe) of danger trees within 150 feet of roads and habitat modifications approved in advance by the Services. The uneven-aged harvest retention standard of 50 or more healthy dominant or co-dominant trees per acre will ensure sufficient trees are remaining after harvest to develop into a fully stocked stand of large trees by the time the stand is 100 years old. Although uneven-aged harvesting is considered largely a habitat improvement measure in this zone, Tacoma will limit the harvest that occurs in any one year to an average of 2 percent of the total conifer-dominated stands in the zone. This will provide a safeguard on water quality.

Stands dominated by hardwood species in the Conservation Zone may be converted to conifers (through clearcutting) as further habitat improvement, but this will only occur on sites capable of supporting coniferous forest stands. Once converted to conifers, those stands will only be subjected to uneven-aged harvesting, if necessary, until age 100, and no harvest (other than danger tree removal and habitat improvement) will occur after age 100.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01D

MEASURE: Commercial Zone

Tacoma will manage coniferous forest stands in the Commercial Zone on an even-aged harvest rotation of 70 years. Tacoma will conduct even-aged harvesting of stands dominated by coniferous trees (> 50 percent conifer species by basal area) only when stands are at least 70 years old, and will conduct even-aged harvesting on an average of no more than 1.5 percent of the conifer-dominated stands in the Commercial Zone per year, averaged over the term of the HCP. When conducting commercial thinning in the Commercial Zone prior to even-aged harvest, Tacoma will leave a minimum of 50 healthy dominant and codominant coniferous trees per acre, where available, and will comply with the snag, green recruitment tree and log retention standards of Measure HCM 3-01G. This zone contains 3,858 acres. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to identify and appropriately manage lands in the upper Green River watershed where commercial timber harvest can occur without impacting surface water quality or significantly affecting fish and wildlife habitat.

Rationale and Ecosystem Benefits

The Commercial Zone includes those areas upland of the Natural and Conservation zones where forest practices can occur consistent with the protection of water quality and maintenance of fish and wildlife habitat. The objective in this zone is to grow and harvest commercial timber on a sustainable basis while minimizing impacts to water quality, fish and wildlife, and their habitats. Tacoma will manage coniferous forest stands in this zone on a 70-year, even-aged rotation, which is roughly 1.6 times the average commercial forest rotation in western Washington. This will result in a low average rate of harvest in the zone (1.5 percent per year) and will eventually lead to an even distribution of second growth forest age classes within the zone.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01E

MEASURE: Hardwood Conversion

Stands in the Conservation Zone and Commercial Zone dominated by hardwood species (> 50 percent hardwoods by basal area) on sites capable of producing conifers of commercial size (Douglas-fir 50-year site index ≥ 80) may be converted to conifers by clearcutting the existing trees and replanting with conifers as specified in the reforestation HCM. There will be no limit on the number of acres of hardwood-dominated stands that can be harvested and converted to conifers in a given year. All other even-aged harvest measures in this HCP will apply to hardwood conversions. Hardwood conversion will not occur in no-harvest riparian buffers. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to encourage the conversion of hardwood forest to coniferous forest in order to improve surface water quality and enhance habitat for fish and wildlife.

Rationale and Ecosystem Benefits

Hardwood species such as red alder (*Alnus rubra*), bigleaf maple (*Acer macrophylum*), and black cottonwood (*Populus trichocarpa*) are natural components of the coniferous forest landscape in western Washington, but their abundance has increased significantly over the past century as a result of commercial timber harvest. Where they were once limited to sites with moist soils and/or frequent natural disturbances (such as forested wetlands and low-gradient stream corridors), they are now common on upland sites where alteration of soil conditions and/or poor regeneration practices in the past have delayed the return of coniferous species that existed prior to harvest. The Upper HCP Area will continue to support these hardwood tree species (and the wildlife that utilize

them) in riparian corridors, forested wetlands, upland sites with frequent disturbances and throughout the Natural Zone, but other sites that supported mature conifer stands prior to earlier timber harvesting will be converted back to conifers by clearcutting existing hardwoods and replanting with seedling Douglas-fir (*Pseudotsuga menziesii*) or other suitable conifers. The eventual benefits to fish and wildlife will be those associated with the presence of late-seral coniferous forest habitat (in the Conservation Zone) and second-growth coniferous forest (in the Commercial Zone).

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01F

MEASURE: Salvage Harvesting

Tacoma may conduct salvage timber harvesting in forested areas affected by windthrow, insect infestation, disease, or fire, subject to the following conditions:

- No salvage harvesting will occur in the Natural Zone or in stands over 100 years old in the Conservation Zone, except for selective removal (or topping when it is safe) of trees within 150 feet of roads. Danger trees felled in the Natural Zone will be left as wildlife habitat, or removed to be used elsewhere to meet one or more of the Conservation Measures of this HCP.
- No salvage harvesting will occur within no-harvest portions of riparian or wetland buffers, or within forested areas with a Douglas-fir 50-year site index of ≤ 80 (i.e., Upland Management Areas). **Danger trees felled within no-harvest riparian buffers will be placed on the streamside portion of the buffer.**
- Individual salvage harvest areas will include no more than 120 contiguous acres**.** ~~without prior coordination with the WDFW, USFWS, and NMFS.~~
- Salvage harvesting will be conducted in a manner that complies with the snag, green recruitment tree and log retention requirements of Measure HCM 3-01G**, except the total number of safe snags required to be left will not exceed six per acre**.
- Salvage harvesting in stands less than 100 years old in the Conservation Zone will be conducted in a manner that complies with the uneven-aged harvesting requirements of Measure HCM 3-01C, except there will be no limitation on the number of acres of salvage harvesting in any year.
- Salvage harvesting may occur in stands less than 100 years old in the Conservation Zone when insects, fire, windthrow, or disease reduces total canopy closure to less than 40 percent over 2 or more acres.
- Salvage harvesting may occur in the Commercial Zone when insects, fire, windthrow, disease, or flood reduces total canopy closure to less than 40 percent over 2 or more acres. Tacoma will fund all the costs associated with this measure**.**

- **No tree, or portion of a tree, that has entered the stream channel will be salvaged.**
- **Live healthy coniferous trees will not be felled during salvage harvesting unless such felling is necessary to access and remove dead and damaged trees in a safe and economical manner**.

Objective

The objective of this measure is to protect surface water quality and habitat for fish and wildlife by establishing restriction on the salvage harvest of timber.

Rationale and Ecosystem Benefits

Salvage harvesting will help maintain the health of the forest in the Commercial Zone and contribute to the economic return from these lands, ultimately benefiting the other watershed management programs that require funding. However, salvage harvesting can have negative impacts on water quality and habitat if not conducted properly. Measures are therefore necessary to avoid any negative impacts of salvage harvesting.

No salvage harvesting will occur within no-harvest riparian buffers, or in areas not suited to commercial production of conifers (i.e., those with a site index ≤ 80). Salvage harvesting will also be restricted in the Natural Zone and in stands over 100 years old in the Conservation Zone because it is counter to the objective of creating and maintaining late-seral forest conditions. In the Commercial Zone and the remainder of the Conservation Zone, fire, wind, or disease must reduce the canopy closure below 40 percent over 2 or more acres before salvage harvesting can occur. This will limit salvage operations to those instances where there is the potential for a significant area within the zone to be without a forest cover as a result of disturbance. Smaller disturbances, and all disturbances caused by flooding in the Conservation Zone, will be allowed to recover naturally without intervention or salvage harvesting.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01G

MEASURE: Snags, Green Recruitment Trees, and Logs

When conducting even-aged harvesting, uneven-aged harvesting, or commercial thinning ~~or salvage harvesting~~ in the Upper HCP Area, Tacoma will retain all safe snags and at least four green recruitment trees (≥ 12 inches dbh) and four logs (≥ 12 inches diameter; ≥ 20 feet long) per acre, where available. At least one of the green recruitment trees will be ≥ 20 inches dbh, and another will be ≥ 16 inches dbh. If

sufficient green recruitment trees of this size are not available, the largest available green trees will be left. No more than two of the green recruitment trees can be hardwoods. Preference will be given to leaving large, live defective green recruitment trees. If at least six safe snags (≥ 12 inches dbh; ≥ 20 feet tall) are not available per acre of harvest, additional green recruitment trees (≥ 12 inches dbh) will be left at a replacement ratio of 1 to 1. If at least two safe snags ≥12 inches dbh and ≥ 20 feet tall are not available per acre of harvest in stands with an average stand dbh ≥ 12 inches, up to two of the green recruitment trees will be topped, girdled, inoculated with fungus or otherwise killed to create new snags at the time of harvest. Green recruitment trees will be killed at a replacement ratio of 1 to 1, so that at least two snags or recently killed recruitment trees are left per acre of harvest, averaged over the harvest unit. Snags and green recruitment trees will be scattered or clumped within harvest units, depending on pre-harvest distribution, harvest limitations, safety and likelihood of long-term survival. In the Commercial Zone, the preferred method will be to leave snags and green recruitment trees in clumps along stream and wetland buffers, adjacent to Upland Management Areas (UMAs) or along harvest unit boundaries. In the Conservation Zone, Tacoma will attempt to leave snags more evenly distributed among the 50 or more dominant or codominant trees remaining after harvest. In the Natural Zone all snags will be allowed to persist naturally unless determined to be safety hazards in accordance with Measure HCM 3-01F. The distance between clumps will be no greater than 600 feet. Clumps will include 10 or more snags and/or green recruitment trees, and 4 or more logs. Snags and green trees left to meet riparian buffer requirements or left in UMAs will count toward meeting the requirements of this measure for one harvest unit directly adjacent to each riparian buffer or UMA. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect and enhance habitat for cavity-dwelling wildlife in the upper Green River watershed.

Rationale and Ecosystem Benefits

Snags, residual live trees, and logs provide several essential habitat elements to fish and wildlife. Snags and large trees in riparian areas contribute LWD for instream cover, pool formation, sediment trapping, bank stabilization, and nutrient input. Snags, large trees, and logs in riparian and upland areas also provide nests, burrows, perches, and foraging substrate for a wide range of wildlife species, some of which would not occur in a given area without the presence of these habitat features. Most wildlife species covered by this HCP make use of snags, large trees and/or logs; two (Vaux's swift and pileated woodpecker) are dependent on them. In the past, common practice in the Pacific Northwest was to eliminate snags, large trees, and logs during timber harvest because they presented hazards to worker safety, interfered with harvest operations, occupied

space potentially available to new tree seedlings, and/or had commercial value if removed from the forest. These concerns still exist today, but Washington Forest Practices Rules and Regulations now require retention of certain numbers of snags, trees, and logs at the time of even-aged harvest, subject to maintaining safe and economic working conditions. The measure for snag, green recruitment tree, and log retention in this HCP is double the current state requirement in terms of the number of pieces to be retained. This HCP measure also requires that at least some of the trees be of a larger size than required under state regulation. The maximum allowable spacing between snags and green recruitment trees is also less in this HCP than in state regulations, to account for species with small home ranges that may require these habitat elements to be distributed more evenly across the landscape. The two HCP species of most concern relative to snags (Vaux's swift and pileated woodpecker) are addressed in species-specific measures elsewhere in this HCP.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01H

MEASURE: Harvest Unit Size

Even-aged harvest units (i.e., clearcuts) in the Upper HCP Area will not exceed 40 acres in size. Uneven-aged and salvage harvest units will not exceed 120 acres in size without prior review by WDFW and approval by the USFWS and NMFS. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to minimize the effects of timber harvest on water quality, fish, and wildlife by limiting the size of individual harvest units.

Rationale and Ecosystem Benefits

Even-aged harvesting is an essential management tool in western Washington, where commercially valuable coniferous species such as Douglas-fir are intolerant of shade and will not regenerate under existing forest canopies. Even-aged harvesting is also environmentally less damaging under certain circumstances because it can be conducted with fewer roads and less ground impact on steep slopes than can uneven-aged harvesting. However, even-aged harvesting can be detrimental to water quality and fish and wildlife habitat if conducted in large harvest units or in multiple small units over a very short period of time. To avoid such impacts, even-aged harvest units in the Upper HCP Area will be limited to 40 acres in size.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01I

MEASURE: Even-aged Harvest Unit Adjacency Rule

Even-aged harvesting will only occur when the surrounding forestland is fully stocked with trees a minimum of five years old or a minimum of 5 feet high. This measure will not apply to lands incapable of supporting fully stocked forest stands or lands converted to a non-forest use adjacent to harvest units. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to minimize the effects of timber harvest on water quality, fish, and wildlife by limiting the rate of harvest in a local area.

Rationale and Ecosystem Benefits

As noted under other habitat conservation measures, even-aged harvesting can be conducted with minimal impact to water quality and habitat if the size of harvest units is limited. This measure exceeds current Washington State Forest Practices Rules and Regulations, which require that at least 90 percent of the perimeter of a harvest unit be surrounded by trees at least five years old or at least 4 feet tall, and that the stands of surrounding forest be at least 300 feet wide. Proposed habitat conservation measures, combined with the limited area in which even-aged harvesting occur (Commercial and Conservation zones only) and the very low rate of harvest (average of 1.5 to 2.0 percent per year by zone, respectively), ensure that the negative effects of even-aged harvesting will be avoided in the Upper HCP Area.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01J

MEASURE: Harvest Restrictions on Sites with Low Productivity

Timber harvesting in the Upper HCP Area will occur only on lands with a Douglas-fir 50-year site index of 80 or greater. Lands with lower site indices will be designated as Upland Management Areas (UMAs) and managed without timber harvest for the term of the HCP. Snags and green trees left in an UMA will count toward meeting the requirements of HCM 3-01G for one harvest unit directly adjacent to each UMA. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to minimize the long-term ecological impacts of timber harvest by restricting harvest on sites with low productivity.

Rationale and Ecosystem Benefits

Timber harvesting in the Upper HCP Area will occur only on sites capable of sustained timber production under a 70-year, even-aged rotation. For purposes of this HCP, harvestable sites are defined as those with a Douglas-fir 50-year site index of 80 or greater. Site index is the height (in feet) that a dominant tree of a given species will reach within the specified period of time. Site index for Douglas-fir at 50 years in the western Washington Cascades can be as high as 160, but most commercial stands have site indices between 80 and 140. Sites with lower productivity are still capable of producing trees of commercial size, but the sites are often expensive to harvest, difficult to regenerate, and susceptible to water quality impacts because of erodable and/or easily compacted soils. They are not well suited to repeated harvesting at 70-year intervals. To avoid the potential impacts associated with harvesting and subsequent regeneration of these areas, Tacoma will protect them from harvest and retain them as permanent habitat. There are approximately 103 acres in the Conservation Zone and 150 acres in the Commercial Zone that have been set aside as UMAs. They range in size from 1 to 30 acres, and are mostly dominated by Douglas-fir growing on thin soils.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01K

MEASURE: Contractor, Logger, and Employee Awareness

All successful timber purchasers, loggers, and other forestry contractors operating in the Upper HCP Area will be provided copies of the pertinent HCP measures and required to comply with all relevant terms and conditions of the HCP while conducting any activities in the Upper HCP Area. All full-time Tacoma employees working in the Upper HCP Area will be instructed in the identification of all species covered by this HCP and their nests, dens, and preferred habitat. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to ensure successful implementation of the Tacoma HCP by informing and instructing employees and contractors working in the HCP Area.

Rationale and Ecosystem Benefits

The effectiveness of this HCP will ultimately depend on the successful implementation of all mitigation measures in the field. To that end, all operators, contractors and full-time Tacoma employees working in the Upper HCP Area will be provided the necessary information to ensure they conduct their activities in compliance with the HCP.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01L

MEASURE: Logging Slash Disposal

Tacoma will burn no logging slash in the Natural Zone, unless the burning is part of a habitat modification effort reviewed by WDFW and approved in advance by the USFWS and NMFS. Logging slash generated during timber harvesting operations in the Conservation and Commercial zones may be treated by mechanical- and/or hand-piling followed by burning (both zones), or by broadcast burning (Commercial Zone and powerline rights-of-way within the Conservation Zone only). Harvested areas on slopes of 30 percent or less may be mechanically scarified with low-ground-pressure tractors if slash and/or brush interfere with replanting. No mechanical scarification will occur on slopes greater than 30 percent. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to minimize the effects of timber harvest on water quality and habitat for fish and wildlife by restricting the burning of logging slash.

Rationale and Ecosystem Benefits

Harvest-related slash (tree tops, limbs, bark, and brush) can create a fire hazard and interfere with forest regeneration. Burning is an effective means of eliminating slash, preparing soils for regeneration, and reducing future competition between brush and tree seedlings. Burning can have negative impacts, however, if it reduces soil fertility, contributes to soil erosion, and eliminates snags, logs, and shrub cover that can provide fish and wildlife habitat. Tacoma will conduct no slash burning in the Natural Zone, unless specifically prescribed as a habitat improvement measure. In the Conservation Zone, Tacoma will burn slash only in piles (i.e., no broadcast burning except under powerline rights-of-way to improve forage) to avoid soils impacts and allow for the retention of snags, logs, and brush outside piles. In the Commercial Zone, the use of broadcast burning will be minimized to those areas where it is necessary to reduce fire hazard and achieve adequate regeneration. Pile burning will be the preferred method of slash disposal in the remainder of the Commercial Zone. Mechanical scarification, which is an alternative to burning, will be employed where it will achieve the same results as burning without the negative impacts to soils and habitat. Mechanical scarification can lead to problematic erosion on steep slopes, so Tacoma will conduct no mechanical scarification on slopes over 30 percent.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01M

MEASURE: Reforestation

All even-aged harvest areas will be replanted with 300 to 400 suitable tree seedlings per acre by the first spring following harvesting. Douglas-fir will be the preferred species for planting, but shade-tolerant western hemlock, western red cedar, or true fir will be planted on sites not suitable for Douglas-fir. Openings in uneven-aged harvest areas will be replanted with 50 to 100 shade tolerant conifers per acre. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to ensure long-term productivity and optimal habitat benefits of commercial timberlands in the upper Green River watershed by requiring reforestation after harvest.

Rationale and Ecosystem Benefits

Quick and effective regeneration of harvested areas will be important to meeting the HCP objectives of maintaining water quality and providing habitat for fish and wildlife. Tacoma will replant harvest units at the earliest logical date (the first spring following harvest, when conditions are favorable for seedling establishment) and will plant sufficient numbers of seedlings of the appropriate species to achieve a healthy, diverse forest stand in the shortest time practical.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-01N

MEASURE: Harvest on Unstable Slope

Tacoma will conduct harvest activities on unstable landforms in accordance with prescriptions developed through Watershed Analysis, unless the Watershed Analysis prescription(s) would be less restrictive than one or more HCP measures specific to timber harvest. Tacoma personnel responsible for harvest unit layout will receive field training in the identification of potentially unstable landforms. ~~Tacoma will fund 100 percent of the costs associated with this measure.~~

In WAUs where a slope stability assessment and draft and final prescriptions have not been completed through the formal WDNR watershed analysis process within two years of issuance of the ITP, Tacoma will fund the assessment and mapping of lands within the Tacoma ownership using landforms described in previous analyses, or by identifying new landforms if necessary. Interim prescriptions completed to fulfill commitments made in this HCP will equal or exceed existing state rules and will be submitted to the DNR for review via the usual **Forest Practices Application** ~~EPA~~ Class IV special permit process and be approved by the Services. Draft prescriptions

developed to address slope stability associated with timber harvest on similar landforms in the Lester, Howard Hanson/Smay and Upper Green/Sunday Watershed Analyses will be applied until official Watershed Analyses have been completed and approved. **Tacoma will fund 100 percent of the costs associated with this measure.**

Objective

The objective of this measure is to protect long-term productivity of commercial timberlands in the upper Green River watershed and minimize the effects of timber harvest on water quality and fish habitat by restricting timber harvest on sites with a fish potential for slope failure.

Rationale and Ecosystem Benefits

Mass wasting assessments conducted to date in the upper Green River HCP Area have identified a relatively consistent suite of landforms that are considered to have a moderate to high mass wasting potential. These landforms, called Mass Wasting Mapping Units (MWMUs) include earthflow toes, bodies and scarps; inner gorges; headwalls; glaciofluvial terrace escarpments, and steep undissected hillslopes in various geologic units (Plum Creek 1996; USFS 1996).

Maps depicting the general location of the MWMUs have been completed for five of the six WAUs in the upper Green River HCP Area, and prescriptions have been developed to reduce the risk of future management-related mass wasting from those MWMUs with a moderate to high mass wasting potential (Appendix D). Implementation of many of those prescriptions requires field delineation of the mapping units. The descriptions of the MWMUs are intended to be used as a guide to delineate the actual boundaries of the map unit in the field during layout of proposed harvest units. To facilitate identification of potentially unstable mapping units, Tacoma will require employees or contractors responsible for harvest unit layout to attend a field course in the identification of unstable slopes at least once every five years.

Draft and final prescriptions developed to date require field mapping of inner gorges, headwalls, zero-order basins with slopes > 70 percent, and areas of active mass-wasting or potential instability. Harvest units located on steep zero-order basins, snow avalanche chutes, slump/earthflow toes, escarpments along the Green River, and within bedrock hollows or within 100 feet of recent slumps that feed into inner gorges or linear draws in canyons of mainstem tributaries must be reviewed by a slope stability specialist. No harvest will be allowed in headwalls, inner gorges (extending 20 feet beyond the slope

break or at least 50 feet from the ordinary high water mark where no slope break is present), within one crown width (approximately 20 feet) of steep Type 4 and 5 streams with sideslopes >70 percent on slump/earthflow bodies or within 20 feet of active landslides.

Tacoma will implement existing draft and final watershed analysis prescriptions upon issuance of the ITP regardless of whether the analyses have been formally approved by the Washington Department of Natural Resources (WDNR). Upon completion and approval of future Watershed Analyses, Tacoma will implement any additional prescriptions that may be approved.

In WAUs where assessments have not yet been completed, Tacoma will utilize descriptions of landforms developed for other WAUs within the upper Green River watershed to map and assess slope stability on lands within the HCP Area, or will develop new landform descriptions if necessary. The assessment will be completed by a slope stability specialist certified to conduct a Level 2 Mass Wasting Analysis under the WDNR training program. Until formal watershed analyses have been completed and approved, Tacoma will implement prescriptions that have been developed and approved for similar landforms in adjacent WAUs.

5.3.2 Habitat Conservation Measure: HCM 3-02 Riparian Management Measures

RIPARIAN MANAGEMENT MEASURES

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-02A

MEASURE: No-Harvest Riparian Buffers

In addition to the general harvesting restriction in the Natural Zone (HCM 3-01B), the limitation on harvesting in the Conservation Zone (HCM 3-10C) and the implementation of a 70-year sustainable harvest rotation in the Commercial Zone (HCM 3-01D), Tacoma will retain no-harvest riparian buffers along all streams and around wetlands in the Upper HCP Area. Minimum widths of riparian buffers will be as shown in Figure 5-5 and Tables 5-2 and 5-3. Riparian buffer widths may be increased (but not decreased) through a formal Washington State Forest Practices Board Watershed Analysis. ~~Harvest~~ **Timber management** activities will occur within no-harvest portions of riparian buffers only to modify fish or wildlife habitat or further other goals of this HCP, and only with prior review by WDFW and concurrence of the USFWS and NMFS. **Trees cut as a result of such activities will be left within no-harvest riparian buffers.**

Timber yarding may occur across Stream Type 4 and 5 riparian buffers, but such yarding will be limited to full or partial suspension cable yarding (no ground-based yarding) and will affect no more than 15 percent of the total length of buffer within or adjacent to a given harvest unit. Yarding corridors across landforms with a moderate to high mass wasting potential will be no wider than 30 feet and located on slopes < 80 percent with no indication of seasonal saturation or recent slope movement. Full log suspension will be utilized in all potentially unstable landforms and within 20 feet of stream channels in areas of high sediment delivery potential. Any trees within a riparian buffer that are killed or damaged by yarding operations will be left in the buffer (i.e., they will not be salvaged). Tacoma will fund all the costs associated with this measure. See following Figure 5-5 and Tables 5-2 and 5-3.

Objective

The objective of this measure is to protect and enhance water quality and habitat for fish and wildlife by timber harvest directly adjacent to streams.

Rationale and Ecosystem Benefits

Riparian zones are areas with unique soil, vegetation and resource values, comprised of an aquatic ecosystem, seasonally flooded banks or terraces and adjacent upland areas that have a direct influence on the aquatic habitat. Numerous authors have identified a need for riparian buffers along streams for the purpose of maintaining or enhancing key riparian functions (Bisson 1987; Castelle et al. 1994; Belt and O'Loughlin 1994). One of the primary functions of the riparian buffer is the recruitment of large woody debris (LWD). McDade et al. (1990) observed that ninety percent of the LWD delivered to streams in unmanaged, mature Douglas-fir/hemlock stands in western Washington and Oregon were derived from within 100 feet of the stream channel. Similar studies by Murphy and Koski (1989) in old-growth Sitka spruce and hemlock forests southeast Alaska indicate that 99 percent of the in-channel LWD was recruited from 100 feet of the stream. Robison and Beschta (1990) suggested that buffer strips with widths on each stream bank at least equal to tree height would provide for maximum amounts of LWD. LWD loading is related to the number of mature trees along the stream, and to local geologic and channel morphologic conditions (Martin in press; Keller et al. 1995).

Trees and undisturbed understory vegetation within riparian buffers also stabilize banks, filter sediment, and provide shade and nutrients. The contribution of root strength to maintenance of bank stability declines at distances greater than one-half the crown diameter (Burroughs and Thomas 1977). Filter strips 200 to 300 feet wide are generally effective in controlling sediment that is not channelized (Haupt 1959). Broderson (1973) found that buffers 200 feet wide effectively controlled sedimentation, even on steep

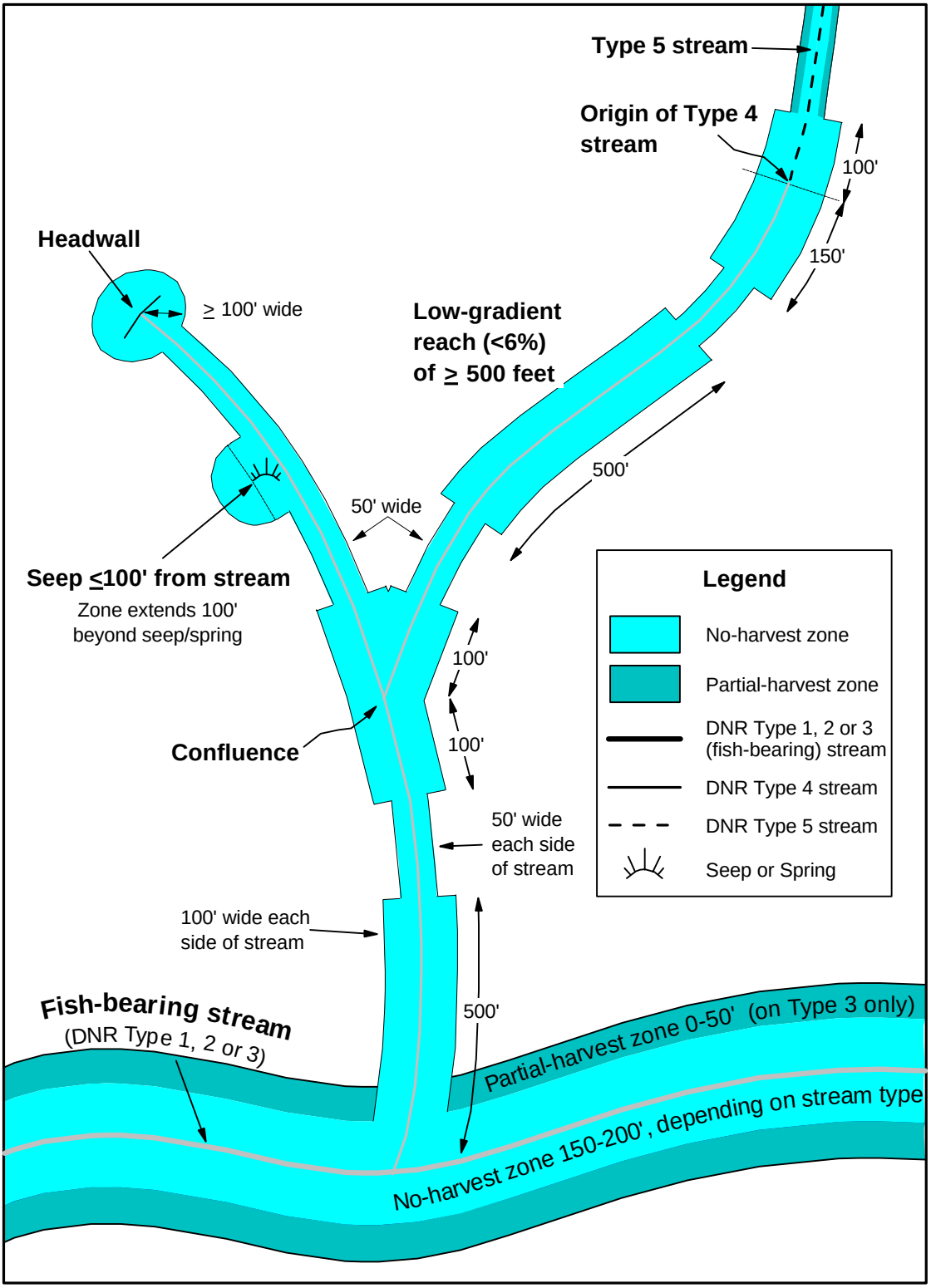


Figure 5-5. Diagram of Type 4 stream buffer zone implementation.

Table 5-2. Stream buffer widths for the Tacoma Green River HCP.

DNR Stream Type [1]	No-Harvest Buffer Width [2, 4]	Partial-Harvest Buffer Width [3, 4]
Types 1 and 2	200 feet	0
Type 3	150 feet	50 feet
Type 4	50 to 100 feet [4,5]	0
Type 5	25 feet	25 **feet**

[1] All streams (currently mapped or unmapped) within 200 feet of a proposed forest practice will be evaluated in the field in accordance with current Washington Forest Practices Rules and Regulations prior to submission of a Forest Practices Application to determine if they should be re-classified.

[2] Buffer width will be measured horizontally from the **edge of a streambank full width or the outer edge of its** ~~ordinary highwater mark~~, channel migration ~~zone, or channel~~ disturbance zone, whichever is greater, along each side of the stream. Buffer width around Howard Hanson Reservoir will be measured horizontally from elevation 1,177 feet above mean sea level. **Only fish and wildlife habitat mitigation work will be allowed to occur in this buffer.**

[3] Partial-harvest buffer width will be measured horizontally from the outer edge of the no-harvest zone along each side of the stream. **Partial harvest will leave not less than the 70 largest conifer trees per acre in buffers along Type 3 waters, and not less than the 50 largest conifer trees per acre in buffers along Type 5 waters.**

[4] **The presence of road or right-of-way will not affect width of buffers. Only that portion of any wood protruding within ten feet of the road tread can be cut to eliminate a safety hazard.**

[5] The no-harvest buffer along Type 4 streams will be a minimum of 50 feet wide, and will be expanded to 100 feet wide:

- at the **upstream** origins of Type 4 streams (including 100 feet upstream and 150 feet downstream);
- at headwalls and along steep and unstable slopes (this width may be further increased by watershed analysis);
- at confluences with other Type 4 streams (including 100 feet upstream and 100 feet downstream);
- at confluences of Type 4 streams with fish-bearing streams (including 500 feet upstream);
- around springs and seeps within 100 feet of Type 4 streams; and
- along low-gradient reaches of Type 4 streams (i.e., those with a gradient of ≤ 6 percent for 500 or more contiguous feet).

Table 5-3. Wetland buffer widths for the Tacoma Green River HCP.

Wetland Type [1]	Wetland Size	No-Harvest Buffer Width [2]
Non-forested Wetlands with ³ 0.5 acre open water		
Type A (all)	> 5.0 acres	200 feet
Type A (all)	0.5 to 5.0 acres	100 feet
Type A (bogs/fens only)	0.25 to 0.5 acre	100 feet
Non-forested Wetlands with < 0.5 acre open water		
Type B (all)	> 5.0 acres	100 feet
Type B (all)	0.25 to 5.0 acres	50 feet
Forested Wetlands(>30 percent canopy cover)		
Type C (all)	> 5.0 acres	50 feet
Type C (all)	0.5 to 5.0 acres	25 feet

[1] All wetland definitions follow Washington Forest Practices Rules and Regulations, WAC 222-16-035, effective July 1995.

[2] Buffer width will be measured horizontally from the edge of the wetland.

slopes. The effectiveness of the riparian buffers at providing shade varies with topography, channel width and orientation, and forest structure, particularly the extent of both understory and overstory vegetation (USDA et al. 1993). As with shade, the distance away from the stream from which litter inputs originate depends on site specific conditions, but riparian forests of widths equal to or greater than 100 feet are believed to be sufficient to maintain nutrient inputs and biotic community structure in streams (USDA et al. 1993).

Riparian forest also plays an important function as habitat for plants and animals. Due to their high overall productivity and their wide range of gradients, aspects, soils and moisture conditions, riparian forests support a diversity of plant and animal life that typically exceeds that of the adjacent upland and aquatic habitats (Odum 1971). Riparian forests provide thermal cover for streamside amphibians that require cool, moist habitats; travel corridors for species that hunt along streams and/or have very large home ranges (e.g., Pacific fisher); and escape cover for most other species that travel to streams on a regular basis for water (Thomas 1979; Taber 1976; Tabor 1976). Riparian forests often also have higher diversities and densities of understory plant life than surrounding uplands, thereby providing habitat to certain birds and mammals that cannot be found in uplands (Stevens et al. 1977). In the shifting mosaic of a managed forest landscape, riparian areas can serve important habitat functions by providing both a stable source of closed-canopy forest and edge habitat at the interface between the riparian forest and recent clearcut.

The upper Green River HCP Area contains ~~146~~ **approximately 110** miles of streams (Table 5-4). Except for the presence of the Green River (including Howard Hanson Reservoir) and its major tributaries in the Natural Zone, the distribution of total stream miles is roughly equivalent among the three management zones. The distribution of stream miles among the DNR stream types is typical of western Washington, with Type 1 and Type 5 being the most abundant.

All 65.11 stream miles in the Natural Zone will be protected because, in accordance with Measure HCM 3-01B, there will be no commercial forestry. Habitat alteration will occur in the Natural Zone only to improve fish and/or wildlife habitat, and only with the prior approval of the Services. Harvesting will take place on a limited basis in the Conservation Zone, and to a greater (although still limited) basis in the Commercial Zone. Measures specific to the protection of riparian and aquatic habitats are appropriate for these zones. Measure HCM 3-02A therefore calls for no-harvest zones of 25 to 200 feet in width along each side of streams in the HCP Area, the width depending on the stream type. Along larger streams (DNR Types 1, 2 and 3) where stream temperature,

LWD and streamside habitat are most critical, no-harvest buffers will be at least 150 feet wide (exceeding the minimum recommendations of Murphy and Koski (1989), USDA (1993) and others. On smaller perennial streams (DNR Type 4) the no-harvest buffers will be at least 50 feet wide, and it will be expanded to 100 feet wide at all sensitive areas such as confluences, low-gradient reaches, seeps, headwalls and stream origins. Type 5 streams are the intermittent headwaters of larger streams. While they provide limited habitat themselves, they lead to larger waters downstream and contribute to the temperature, nutrient levels, and LWD in those larger streams. For those reasons, all Type 5 streams will also have no-harvest buffers of 25 feet in width.

Table 5-4. Stream miles within the upper Green River HCP Area.

	Miles of Stream			
DNR Stream Type	Commercial Zone	Conservation Zone	Natural Zone	All Zones
1	0.71	2.30	41.07[1]	44.08
2	0.08	0.00	0.15	0.23
3	3.06	4.27	8.32	15.65
4	4.81	7.53	5.95	18.29
5	11.95	10.54	9.62	32.11
Total	20.61	24.64	65.11	110.36

[1] Natural includes 7.92 miles of reservoir shoreline

The total area included within no-harvest riparian buffers ~~in the Commercial Zone and Conservation Zone~~ will be 2,126 acres (Table 5-5). In addition to maintaining riparian functions in all streams in the upper HCP Area, the no-harvest riparian zones will develop into a core of late-successional coniferous forest habitat available to riparian as well as upland wildlife species in the watershed. The 686 acres of no-harvest buffer included within the Commercial and Conservation Zones represent 9.8 percent of the total forested area within those (686 ÷ 7,025).

Cable yarding of harvested timber will be allowed through riparian buffers along Type 4 and 5 streams in the Commercial and Conservation zones to minimize the amount of new road construction in these areas. Given the high density of smaller streams in the HCP Area, it is difficult, if not impossible, to reach all harvestable areas without either building temporary logging roads or lifting felled timber across streams with cable yarders. Forest roads have been identified as a major contributor to stream sediment in western Washington, so it is one objective of this HCP to minimize new road construction. This will necessitate occasional yarding across streams. All yarding will be done by cable, with one or both ends of the log suspended above the ground, so soil

disturbance will be minimized. The typical result will be damage (i.e., limb breakage and/or topping) of trees in the yarding corridor. With the long harvest rotations of 70 years or more in the HCP Area (i.e., long return intervals for any one stream segment) and the limitation of no more than 15 percent disturbance to any stream segment, the impacts of yarding across stream corridors will be more than offset by the benefits of reducing new road construction.

Table 5-5. Acres of habitat included within riparian management zones in the upper Green River HCP Area.

DNR Stream Type	No-harvest Buffer Width (feet)	Partial-harvest Buffer Width (feet)	Acres of Commercial Zone [1]	Acres of Conservation Zone [1]	Acres of Natural Zone	Total Acres [1]
1	200	0	123	89	1158	1370
2	200	0	2	0	4	6
3	150	50	148 (+ 49)	103 (+ 34)	188	439 (+ 83)
4	≥50	0	56	59	48	163
5	25	25	68 (+ 68)	38 (+ 38)	42	148 (+ 106)
Total			397 (+ 117)	289 (+ 72)	1440	2126 (+ 189)

[1] Numbers in parentheses reflect acres in partial-harvest buffers.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-02B

MEASURE: Partial-Harvest Riparian Buffers

Tacoma will retain partial-harvest riparian buffers along Type 3 and 5 streams as specified in Table 5-2 and shown in Figure 5-5. Timber harvesting in partial-harvest buffers will comply with all other pertinent measures in this HCP, and will result in leaving the 70 largest coniferous trees per acre along Type 3 streams and the 50 largest coniferous trees per acre along Type 5 streams. At the time of partial-harvesting, preference will be given for leaving: 1) trees that are damaged and/or leaning toward the stream; 2) trees that, due to soil conditions, slope, or proximity to the stream, have a high likelihood of delivering LWD to the stream, 3) trees with deformities or other features that provide unique wildlife habitat elements; and 4) trees with signs of wildlife use (e.g., nests, cavities, foraging holes, etc.). All other considerations being equal, trees nearer the stream will be given preference over trees toward the outer edge of the riparian buffer, so that the density of leave trees may be higher near the stream and lower near the outer edge of the buffer.

Objective

The objective of this measure is to protect and enhance water quality and habitat for fish and wildlife by restricting timber harvest near riparian areas.

Rationale and Ecosystem Benefits

For all the reasons states under the rationale for Measure HCM 3-02A, forested riparian buffers are important to fish, wildlife and water quality. As a margin of safety on Type 3 and 5 streams, Tacoma will manage an additional 25 to 50 feet as partial-harvest beyond the no-harvest riparian buffers. These areas will provide additional LWD, shading and upland forest habitat along streams, to the benefit of species using these areas. More importantly, Tacoma will have the ability to enter these zones and encourage the development of large coniferous trees by removing hardwoods and smaller conifers. This will ultimately lead to improved conditions for both fish and wildlife. Given the post-harvest tree retention standards for these areas, and the long intervals between entries (70 years or more in the Commercial Zone, and no more than one entry total in the Conservation Zone) these areas will differ from adjacent no-harvest buffers for only one to two decades after harvest.

5.3.3 Habitat Conservation Measure: HCM 3-03 Road Construction and Maintenance Measures

ROAD CONSTRUCTION AND MAINTENANCE MEASURES

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-03A

MEASURE: Watershed Analysis

Tacoma will participate in all Watershed Analyses performed according to the Washington Forest Practices Board process for lands within the upper Green River HCP Area. Tacoma will implement all prescriptions prescribed through Watershed Analysis, unless they would be less restrictive than measures described in this HCP. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to encourage comprehensive watershed assessment and management in the upper Green River watershed.

Rationale and Ecosystem Benefits

In 1992, the Washington Forest Practices Board adopted a Watershed Analysis Process for developing individual watershed plans based on a comprehensive understanding of basin-wide processes (Chapter 222-22 WAC). The Watershed Analysis Process includes an evaluation of mass wasting, surface erosion, hydrology, riparian function, channel

geomorphology, fish habitat, public works, and water quality. It is a collaborative scientific process involving Tribes, resource specialists, landowners, agencies, and interested members of the public.

In a Watershed Analysis, qualified scientists gather information and develop interpretations of watershed processes, resource conditions, and sensitivities at the watershed scale. The basic premise of the analysis is that a change in sediment delivery, hydrology, or riparian function resulting from forest practices is significant when it is sufficient to cause an adverse change in a public resources (fish habitat, water quality, and public works). Risks to public resources are identified and supported with data generated by the analyst team. The results of a Watershed Analysis are presented using maps of sensitive areas and reports describing the nature of the sensitivity. Land managers and resource agency representatives use the information to develop management prescriptions that have been tailored to watershed conditions in response to resource concerns identified by the scientific investigation. Monitoring plans are often recommended to track the effectiveness of prescriptions and to provide feedback as to whether resource conditions are actually improving as a result of the prescriptions. Relevant data collected as part of the HCP monitoring process will be provided to analysts upon request.

Upon completion of the draft assessment report and prescriptions, an environmental checklist is completed, as required under the State Environmental Policy Act, and the report and prescriptions are forwarded to the WDNR Resource Protection and Service Assistant Regional Manager for Threshold Determination and Final Approval. Tacoma implements draft prescriptions once they have been completed, adjusting them as necessary if changes are made during the approval process. Products of the watershed analysis are assumed to be valid for five years, at which time the process may be repeated and prescriptions modified if necessary.

The existing Department of Natural Resources (DNR) Watershed Analysis Process is designed primarily to protect fish habitat, water quality, and capitol improvements of the state from impacts resulting from forest practices. The process provides protection for public resources through prescriptions designed for regulatory application. Problems or events not regulated by forest practices may also be identified in the analyst report. The process may identify opportunities for resource enhancement or restoration that can be undertaken voluntarily outside of regulation. Upland forest habitats for terrestrial plants and animals are protected only incidentally, although incidental protection can be substantial, especially for other aquatic species.

The state of Washington has been divided into Watershed Administrative Units (WAUs) ranging in size from 10,000 to 50,000 acres. The Green River HCP area contains six WAUs. The DNR is responsible for prioritizing and conducting Watershed Analyses. Individual landowners with more than 10 percent of the non-federal forest lands within a WAU may initiate a Watershed Analysis. Tacoma will actively participate in all Watershed Analyses performed according to the Washington Forest Practices Board process for lands in the upper Green River HCP Area. Active participation will include attending start-up, synthesis and hand-off meetings and supplying at least one prescription team member. Tacoma has been and is participating in five of the six watershed analyses that have been completed or are currently under way. Tacoma will also participate in the proposed North Fork **Green** Watershed Analysis scheduled to begin in July of **2000**~~1999~~. Appendix D contains an example of prescriptions governing surface erosion, mass wasting, and hydrology from the Lester WAU. Draft prescriptions developed to date for other WAUs are generally similar to the prescriptions contained in Appendix D. Table 5-6 summarizes the current status of State DNR Watershed Analyses in the upper Green River HCP Area in which Tacoma has participated or will participate.

Table 5-6. Status of watershed analyses in the upper Green River Basin as of February 1999.[1]

WAU	Acres	Start	Draft Assessment	Draft Prescriptions	SEPA	Final Assessment and Prescriptions
Lester **Creek**	32,803	10/11/94	9/11/95	3/25/96	7/29/96	3/16/98
Sunday **Creek**	15,571	7/10/95	6/97	2/99	~~*5/99*~~***12/00***	~~*8/99*~~***6/01***
Green **Headwaters**	23,688	7/10/95	6/97	2/99	~~*5/99*~~***12/00***	~~*8/99*~~***6/01***
Howard Hanson	46,501	10/23/96	~~2/99~~**6/97** [2]	2/99	~~*6/99*~~***3/01***	~~*9/99*~~***9/01***
Smay **Creek**	14,415	10/23/96	~~2/99~~**6/97** [2]	2/99	~~*6/99*~~***3/01***	~~*9/99*~~***9/01***
North Fork **Green**	17,728	*7/~~99~~**00***	~~*10/99*~~***3/01***	~~*2/2000*~~***6/01***	~~*5/2000*~~***9/01***	~~*8/2000*~~***12/01***

[1] Italics indicate expected completion date.

[2] **Field work complete but reports not yet available for review.**

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-03B

MEASURE: Road Maintenance

Tacoma will continue to construct and maintain roads throughout all three zones in the Upper HCP Area (subject to compliance with other measures in this HCP) to facilitate

watershed management, forestry activities and implementation of this HCP. Within two years of issuance of the ITP, Tacoma will contribute funds and participate in the development of a Road Sediment Reduction Plan (RSRP) describing the priorities and schedule for road maintenance, improvement and abandonment activities that will be implemented to reduce road sediment inputs to less than 50 percent of the estimated natural background sediment production rate. The RSRP will include an evaluation of surface erosion concerns for roads in subbasins that currently have moderate to high estimated road sediment yields (>50 percent over background). In addition, all existing roads in areas with a moderate to high mass wasting potential will be reviewed by a specialist in slope stability and road construction/repair. The results of specialist's evaluation and proposed correction or mitigation activities will be included in the RSRP. The RSRP will include a prioritization and timetable for road repairs. Problems classified as high priority will be corrected by the third year following approval of the RSRP.

In WAUs where a watershed Analysis has been completed and approved, Tacoma will contribute funding for a road inventory and participate in the development of the RSRP in cooperation with other landowners in the WAU. Funding will be proportional to the percentage of land owned by Tacoma in each subbasin. In WAUs where a Watershed Analysis has not been formally approved within two years of issuance of the ITP, Tacoma will take primary responsibility for funding and preparation of a RSRP that covers roads on or used to access the Tacoma ownership.

Objective

The objective of this measure is to protect water quality and fish habitat in the upper Green River watershed through proper road maintenance.

Rationale and Ecosystem Benefits

Sedimentation of salmonid spawning habitat is a concern throughout the Pacific Northwest. A positive correlation has been observed between the area of logging roads in a basin and levels of fine sediment in downstream spawning gravel (Cederholm et al. 1981). As the level of fine sediment in spawning gravel increases, survival of salmonid eggs and fry declines (Tappel and Bjornn 1983; Reiser and White 1988; Young et al. 1991).

Surface erosion assessments performed for the Lester, Sunday, Green, Howard Hanson and Smay Watershed Analyses indicate that road-related sediment inputs currently exceed background levels by more than 50 percent in a number of subbasins in the upper Green River HCP Area. Sediment yield increases greater than 50 percent may be chronically detectable and have the potential to adversely effect aquatic resources (WFPB 1997). Final or draft prescriptions for Watershed Analyses conducted to date in the upper

Green River HCP Area call for each landowner to complete an RSRP that describes planned road maintenance, improvement and abandonment activities including the priorities and schedule for activities that will be implemented to reduce road sediment inputs. The RSRP must be submitted within one year following approval of the analysis. Plans must be submitted to WDNR each year until the objective of reducing road sediment delivery below 50 percent of background has been achieved. Sources of road erosion classified as high priority must be treated by the end of the third year following analysis. All remaining work prescribed under the plan must be treated within five years of approval. The road surface erosion model used in the Surface Erosion Module Version 3.0 shall be applied annually following completion of road maintenance activities to evaluate the adequacy of efforts implemented to satisfy the 50 percent background objective.

Mass wasting assessments conducted as part of the Lester, upper Green/Sunday, and Howard Hanson/Smay Watershed Analyses have also identified a relatively consistent suite of landforms that are considered to have a moderate to high mass wasting potential. These landforms include earthflow toes, bodies and scarps; inner gorges; headwalls; glaciofluvial terrace escarpments, and steep undissected hillslopes in various geologic units (Plum Creek 1996; USFS 1996). Draft and final prescriptions developed to date require that existing roads on landforms with a moderate or high mass wasting potential must be field evaluated by a specialist in slope stability and road construction/repair within one year of approval of the Watershed Analysis.

Landforms with moderate to high mass wasting potential have been mapped for five of the six WAUs in the upper Green River HCP Area. Those maps, and the corresponding descriptions of each mass wasting map unit will be used to determine the specific location of moderate to high hazard areas in the field, and in WAUs where Watershed Analysis assessments have not been completed. To facilitate accurate field identification of landforms with moderate to high mass wasting potential, Tacoma employees responsible for harvest unit and new road layout will receive training in field identification of unstable lands.

Tacoma will implement both draft and final watershed analysis prescriptions upon issuance of the ITP regardless of whether the analyses have been formally approved by WDNR. In WAUs where assessments have been approved, Tacoma is providing funding for a comprehensive road inventory and developing a RSRP in cooperation with other landowners. Funding for development of the RSRP, and for major maintenance activities is directly proportional to the percentage of land area owned by Tacoma that is tributary

to that road segment. Funding for annual maintenance is proportional to the annual use (i.e., number of loads hauled) by each land owner.

In WAUs where assessments have not yet been completed, Tacoma will assume that all subbasins have the potential for moderate increases in sediment yield (>50 percent) and that all landforms identified as having a moderate to high mass wasting hazard in past Watershed Analyses will have similar hazards. If the Road Sediment Reduction Plan cannot be developed in cooperation with other landowners within two years of issuance of the ITP, Tacoma will provide 100 percent of the funding needed to complete surveys of roads on or used to access Tacoma's lands, and will develop an annual road maintenance, improvement and abandonment plan for those roads. Upon completion of future Watershed Analyses, Tacoma will implement any additional prescriptions that may be approved.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-03C

MEASURE: Road Construction

Tacoma will continue to construct roads throughout all three zones in the Upper HCP Area (subject to compliance with other measures in this HCP) to facilitate watershed management, forestry activities and implementation of this HCP. Tacoma will implement prescriptions developed by Watershed Analysis specific to construction of new temporary or permanent roads across unstable landforms in the Upper HCP Area. Tacoma will cause no net increase in permanent road miles within the Natural Zone over the term of this HCP. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect water quality and fish habitat in the upper Green River watershed through proper road construction.

Rationale and Ecosystem Benefits

Watershed analysis includes an assessment of mass wasting hazards associated with forest management practices, including road building. The potential hazards and mechanisms that may trigger landslide activity vary by landform (Mass Wasting Map Unit), thus specific prescriptions for road construction are developed for each landform. Mass wasting assessments conducted as part of the Lester, upper Green/Sunday, and Howard Hanson/Smay Watershed Analyses have identified a relatively consistent suite of landforms that are considered to have a moderate to high mass wasting potential. These

landforms include earthflow toes, bodies and scarps; inner gorges; headwalls; glaciofluvial terrace escarpments, and steep undissected hillslopes in various geologic units (Plum Creek 1996; USFS 1996). The preferred alternative is to avoid road construction in these landforms. However, locating roads so that they do not cross unstable landforms may result in unacceptable increases in the total length of road constructed.

Draft and final prescriptions for WAUs in the upper Green River HCP Area generally require that a slope stability specialist review all proposed new roads on slump-earthflow toes, avalanche chutes, headwalls, escarpments along the Green River and areas prone to slumping along mainstem tributary canyons. In most cases, full bench construction techniques and end-hauling are required, natural drainage patterns must be maintained, road drainage must be directed away from the unstable landform where possible, and unless the geotechnical review indicates otherwise, stream crossings should be either hardened fords, bridges, or temporary, oversized culverts that are removed within three years of construction.

Upon issuance of the ITP, Tacoma will implement all draft and final mass wasting prescriptions specific to new road construction in WAUs where watershed analyses are approved or pending. In WAUs where assessments have not been completed within two years following issuance of the ITP, Tacoma will complete a slope stability analysis as described in HCM 3-01N. Tacoma will assume that all landforms identified as having a moderate to high mass wasting hazard in past Watershed Analyses will have similar hazards, and utilize the same prescriptions. To facilitate accurate field identification of landforms with moderate to high mass wasting potential, Tacoma employees responsible for harvest unit and new road layout will receive training in field identification of unstable lands. Tacoma will fund 100 percent of the cost required to ensure that roads are constructed in accordance with all applicable prescriptions derived from Watershed Analysis.

Roads will continue to be necessary in the Natural Zone to facilitate access for watershed management activities and to comply with Tacoma's requirements to allow access to adjacent landowner. Limiting roads in the Natural Zone to the current road density may require Tacoma to provide funds for permanently abandoning existing roads according to standards outlined in the Washington State Forest Practices Rules (Chapter 222-24-050 WAC). Tacoma will fund 100 percent of the costs of abandoning existing roads should such activities become necessary to offset construction of new roads.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-03D

MEASURE: Roads on Side Slopes Greater Than 60 Percent

When constructing roads on side slopes greater than 60 percent, Tacoma will use full bench construction with no side casting of excavated materials. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect water quality and fish habitat in the upper Green River watershed by restricting the methods of road construction used on steep slopes.

Rationale and Ecosystem Benefits

Studies of the relationship between forest roads and mass wasting in the Pacific Northwest indicate that inappropriate design, location and construction methods have historically been the primary cause of increased failure rates (Harr and Nichols 1993; Swanston and Swanson 1976). Road construction on steep slopes using cut-and-fill design increases the slope angle, redistributes weight, and may lead to the incorporation of organic materials into road fills, resulting in an increased risk of failure on otherwise stable sites. Full bench road construction on steep slopes has reportedly substantially reduced the incidence of road-related landslides (Sidle et al. 1985). Full bench road construction involves cutting a bench equal to the width of the road into the rock or soil and hauling excess material off-site to a stable storage location (Weaver and Hagans 1994).

Road fill failures were identified as one of the main causes of increased sediment delivery to channels in the Green River Watershed by a recent watershed analysis (USFS 1996). By utilizing only full bench construction techniques on steep slopes, Tacoma will minimize the incidence of future road fill failures, and thus reduce the delivery of sediment to stream channels. Reducing the amount of sediment delivered to stream channels is expected to reduce substrate embeddedness and the proportion of fine sediment in spawning gravel while increasing pool depths.

Full bench construction can cost four to seven times more than cut-and-fill methods (Weaver and Hagans 1994). Tacoma will fund 100 percent of the costs associated with implementing road construction standards beyond those required by Washington State Forest Practices Rules (WAC 222) on steep slopes.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-03E

MEASURE: Erosion Control

Tacoma will place mulch and/or grass seed on all road cuts and fills with slopes over 40 percent or near water crossings, as well as in all locations where there is the possibility of severe erosion or slumping above or below the road. All mainline, primary and secondary roads that Tacoma is responsible for maintaining in the HCP area will be surfaced with gravel. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect water quality and fish habitat in the upper Green River watershed by implementing proper erosion control measures.

Rationale and Ecosystem Benefits

The level of traffic and composition of road surfaces are major determinants of the amount of sediment produced from forest roads. In general, unpaved dirt roads produce almost twice as much sediment per unit area than comparable roads surfaced with a two to six inch layer of gravel (WFPB 1997). Tacoma will work cooperatively with other landowners in the upper Green River HCP Area to ensure that gravel surfacing is maintained on all mainline, primary and secondary haul roads.

Watershed analyses in Washington and Oregon have shown that unvegetated road cutslopes and fillslopes within 200 feet of the stream channel supply fine sediment to stream channels even during periods of light traffic use (Madsen 1998; Veldhuisen 1998). The rate of sediment delivery is a function of slope steepness (Ketcheson and Megahan 1996). Mulch and grass seeding of cut-and-fill slopes may reduce surface erosion by up to 70 percent (Megahan 1987).

By mulching or seeding exposed road cuts and fills in steep terrain, Tacoma will reduce the amount of fine sediment delivered to stream channels via overland flow or drainage ditches. Reducing the amount of sediment delivered to stream channels is expected to reduce substrate embeddedness and the proportion of fine sediment in spawning gravel, while increasing pool depths. Tacoma will fund 100 percent of the costs required to mulch or establish vegetative cover on road cut-and-fill slopes within the Upper HCP Area.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-03F

MEASURE: Stream Crossings

In the limited instance when constructing roads across streams and through riparian buffers is necessary, Tacoma will: 1) minimize right-of way clearing; 2) cross streams and riparian corridors at right angles (wherever possible); 3) minimize disturbance to the natural flow of streams; 4) minimize side casting of excavated materials; and 5) provide for upstream and downstream passage of fish if the stream reaches are fish-bearing. Culvert design criteria to support upstream and downstream passage of salmonids will be developed in coordination with WDFW, USFWS, and NMFS. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect water quality and fish habitat by properly designing, constructing, and maintaining stream crossings.

Rationale and Ecosystem Benefits

Where roads cross stream channels, provisions must be made to pass flow under the road while maintaining up and downstream fish passage. Drainage structures should be large enough to pass flood flows, and should be installed at a grade equal to or slightly lower than the original stream channel gradient so that normal velocity is maintained and so fish do not have to jump up into the structure. Roads should cross the channels at right angles if possible, and culverts should be aligned with the stream channel so that the inlet will not plug, and flow from the outlet is not deflected into the channel bank (Weaver and Hagans 1994).

Stream crossing sites are also the most frequent source of erosion and sedimentation (Rothwell 1983). Because stream crossings are the location where roads come in closest contact with flowing water, it is important to minimize disturbance of riparian buffers, to construct roads using as little fill material as possible, and to dispose of excavated materials outside of the floodplain (Weaver and Hagans 1994). Vegetation removal should be limited, and exposed slopes should be quickly replanted. Fills should be compacted and armored, with excavated material disposed of off-site.

When constructing or reconstructing roads through riparian buffers, Tacoma will minimize right-of-way clearing, cross streams at right angles, and minimize side casting of excavated materials. Stream crossing structures will be designed so that up stream and downstream fish passage is maintained on fish bearing streams. Application of these

measures will reduce the amount of soil disturbance and deposition of loose fill material within the floodplain, thus minimizing sediment-related impacts to fish habitat. Tacoma will provide 100 percent additional design and construction costs required to meet these high road standards.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-03G

MEASURE: Road Closures

Where Tacoma has control over road use, the City will maintain locked gates to restrict use of roads in the Upper HCP Area by the general public, except where U. S. Forest Service or Washington State Department of Natural Resources policy requires that roads remain open. Tacoma will also discontinue heavy truck traffic under its control (e.g., log hauling) when there is a potential for **excessive** ~~extraordinary~~ damage to the road or **water quality impacts that would adversely affect fish.** ~~an impact on water quality.~~ **For purposes of this measure, excessive damage means damage beyond normal wear to the road surface.** Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect water quality and fish habitat by restricting vehicle traffic on Tacoma roads in the upper Green River watershed.

Rationale and Ecosystem Benefits

The amount of sediment generated from road tread surfaces is largely a function of traffic (Reid and Dunne 1984). Increased sediment concentrations associated with heavy truck traffic have been documented throughout western Washington (Bilby et al. 1989; Reid and Dunne 1984; Wooldridge 1979). Sediment produced by vehicle traffic on forest roads is predominantly silt and clay size material that is rapidly flushed through the system at even moderate discharges (Bilby et al. 1989; Bilby 1985). Because of the small size of sediment generated by road use, it rarely deposits or intrudes into the substrate except in the smallest streams (Bilby et al. 1989) or during periods of low flow (Bilby 1985). However, fine sediment generated by road use may increase turbidity, which can decrease primary productivity (Gregory et al. 1987), interfere with the ability of juvenile salmonids to capture prey (Lloyd et al. 1987), and detrimentally impact water quality (EPA 1993).

By restricting access to the Upper HCP Area and suspending log hauling when there is a potential for extraordinary water quality impacts, Tacoma will minimize the impact of the production of sediment caused by road traffic. Road use restrictions are expected to

prevent excessive turbidity from impacting aquatic species or water quality. Incidental benefits to terrestrial wildlife that may be disturbed by frequent vehicle traffic may also occur. Tacoma will fund 100 percent of the costs required to construct and maintain locked gates in the Upper HCP Area.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-03H

MEASURE: Roadside Vegetation

Tacoma will maintain low-growing vegetation along roadsides to stabilize soils and minimize erosion. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect water quality and fish habitat by reducing surface erosion from disturbed soils.

Rationale and Ecosystem Benefits

Surface protection of road cut-and-fill slopes can reduce erosion during storms and prevent or restrain the downslope movement of soil slumps (EPA 1993). Swift (1986) found that vegetated cut-and-fill slopes were more effective than mulched fill at reducing the downslope movement of soil from road cut-and-fill surfaces, and could reduce sediment production by over 90 percent.

Maintaining low-growing vegetation along roadsides in the Upper HCP Area will minimize the production of sediment from road cut-and-fill slopes and reduce the likelihood of sediment-related impacts to fish habitat and water quality. Tacoma will fund 100 percent of the costs required to maintain vegetation along roadsides within the Upper HCP Area.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-03I

MEASURE: Road Abandonment

Tacoma will abandon roads in the Upper HCP Area that are no longer needed for adjacent landowners to access their property, watershed management, forestry operations, or implementation of this HCP. Within two years of issuance of the ITP, Tacoma will prepare and prioritize plans to abandon unnecessary existing roads. Within five years of issuance of the ITP, Tacoma will complete the abandonment of the unnecessary existing roads. New roads constructed in the Conservation and Commercial Zones that are not needed for the above purposes will be abandoned within two years after their use is complete. Roads will be abandoned by: 1) removal

of culverts, fills, water blocks and unstable landings; 2) stabilization of ditch lines and cut banks to a slope of 1.5:1; 3) crowning of road surfaces and placement of water bars every 200 feet; 4) placement of biomatting on steep erodible slopes; 5) re-vegetation of disturbed soils and biomatted areas with grass **and appropriate tree** seed**lings**; and 6) placement of berms or walls of stumps, rootwads, or logs at former entrances to roads. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect water quality and fish habitat by properly abandoning roads that are no longer necessary in the upper Green River watershed.

Rationale and Ecosystem Benefits

There are many reasons for abandoning a forest road, including improving fish and wildlife habitat, excessive maintenance costs, lack of future need due to improved harvest methods, or continuing water quality problems (Weaver and Hagans 1994). In the past, roads were closed by simply prohibiting access. However, sediment yields from closed roads often increase, as severe gullies may form on poorly drained road tread surfaces, and unmaintained drainage structures frequently become plugged and fail catastrophically. Planned abandonment is an inexpensive technique that can prevent future damage to the active road system as well as to aquatic resources by removing potentially unstable drainage structures and fills, restoring the natural drainage network, and revegetating disturbed soils.

By abandoning roads within the HCP area that are no longer needed for watershed management, forestry operations or implementation of this HCP, Tacoma will minimize the potential for future mass wasting and sediment production from unmaintained roads within the Upper HCP Area. In addition, the total length of the road network may decrease, reducing annual sediment inputs as well as the need for expensive long-term maintenance. Tacoma will provide 100 percent of the funding necessary to permanently abandon unneeded roads.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-03J

MEASURE: Culvert Improvements

Within one year of issuance of the ITP, Tacoma will inventory all roads on Tacoma lands to identify artificial barriers that create blockages to fish passage. Within two years of issuance of the ITP, Tacoma (in coordination with other affected landowners, MIT and WDFW) will prepare and prioritize plans for eliminating artificial blockages on roads they are responsible for maintaining. Within five years of issuance of the ITP,

Tacoma will complete the elimination of artificial blockages on Tacoma Lands in the HCP Area as requested and approved by the Services. New culverts, if needed, will be designed and constructed to pass 100-year flood flows and allow up and downstream fish passage. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to increase fish utilization of habitats in the upper Green River watershed by removing man-made blockages to upstream and downstream movement.

Rationale and Ecosystem Benefits

A single poorly installed culvert can eliminate the fish population of an entire stream system (Murphy 1995). Stream crossing conditions that block fish passage include: excessive water velocity, insufficient flow depth, absence of pools that provide resting or jumping space at culvert outlets, and culvert outlets that are too high above the streambed (Furniss et al. 1991). Undersized culverts are likely to become blocked or fail during major storm events (Veldhuisen 1997).

Adult salmon access to the upper watershed is currently precluded; however, the HCP contains provisions to trap adult fish at the Headworks and release them above HHD. Restoring passage at culvert blockages identified in the Upper HCP Area will ensure that anadromous fish have access to habitat within the upper watershed, and will allow unimpeded migration and genetic transfer for resident fish populations.

By completing a systematic inventory of all roads on their lands Tacoma will be able to identify culverts that create blockages to fish passage.

Artificial blockages will be prioritized for treatment as follows:

- barriers to habitat known to have historically been utilized by listed species will be treated first;
- habitat that could be used by anadromous fish as spawning or overwintering areas;
- for resident fish, population risk factors will be considered, such as:
  - > blockages that prevent the ability of populations to recolonize original habitats
  - > blockages that have fragmented existing populations, thereby contributing to poor genetic integrity.

Under each category, the length of habitat upstream of the blockage and the location of the blockage relative to planned management activities and major road maintenance projects will also be considered. Within two years, plans will be completed for re-establishing upstream and downstream passage at sites where such action is deemed necessary by the Services. Artificial blockages on Tacoma lands will be treated as requested by the Services within five years of issuance of the ITP.

Road Sediment Reduction Plans prepared to as part of the watershed analysis prescription addressing existing hazards (Lester Watershed Analysis) must include a methodology for inspecting stream crossings in landforms with a moderate to high mass wasting potential following major storm events. Post-storm inspections will ensure that blockages resulting from high return interval events following the initial inventory are identified and corrected in a timely manner. Stream crossing culverts replaced during the term of the ITP will meet all criteria required to maintain fish passage.

Tacoma will provide 100 percent of the funding required to conduct the systematic road inventory and repair all road-related passage barriers.

5.3.4 Habitat Conservation Measure: HCM 3-04 Species-Specific Management Measures

SPECIES-SPECIFIC MANAGEMENT MEASURES

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04A

MEASURE: Grizzly Bear Den Site Protection

Tacoma will conduct no timber felling, yarding, road construction, or aerial application of pesticides within 1 mile of any known active grizzly bear den from 1 October through 31 May. At other times of year, Tacoma will contact the USFWS and WDFW prior to any timber harvest or road construction within 3 miles of a known grizzly bear den, and the three parties will discuss possible steps that can be taken to minimize impacts to potential denning habitat. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to minimize human disturbance of denning grizzly bears in the upper Green River watershed.

Rationale and Ecosystem Benefits

The HCP Area lies outside the North Cascades Recovery Zone for the grizzly (USFWS 1993), but it is connected to the recovery zone by contiguous habitat. Recent sightings of grizzly bears have been made in the vicinity of the Upper HCP Area outside the recovery zone (Almack 1993, cited in USACE 1996), suggesting that occasional use of the Upper HCP Area may already be occurring. If grizzly bear populations increase in the recovery zone as a result of recovery efforts, individual animals could range into the Upper HCP Area.

Grizzly bears are particularly sensitive to the presence of humans, and will avoid areas of human activity (USFWS 1997). The denning season, which begins in the early fall and extends through spring, is a particularly vulnerable time of year for the grizzly bear. Late initiation of denning or early abandonment of a den as a result of human disturbance can force a bear out of hibernation at a time of year when food is scarce and metabolic demands are high. Agitation of bears within dens, even if it does not lead to abandonment, can impact bears by increasing metabolic demands during hibernation. Such impacts can be avoided by restricting human activity around active dens. The den site protection measures are consistent with current Washington Forest Practices Rules and Regulations for the protection of critical wildlife habitats (WAC 222-16-080[1][c]), and are designed to avoid incidental take of grizzly bears during the denning season.

While grizzly bears seldom reuse specific den sites (Interagency Grizzly Bear Committee 1987), they often den within 0.3 to 3.1 miles of previous dens, and are known to den repeatedly within a radius as small as 1.7 miles. Because the HCP Area is not typical grizzly bear habitat, it is impossible to identify specific activities that should or should not take place in the proximity of grizzly bear dens that might occur in the future. Tacoma will, however, contact the USFWS prior to conducting activities that could alter suitable habitat within 3 miles of known den sites, so that appropriate precautions can be identified.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04B

MEASURE: Grizzly Bear Sightings

Tacoma will suspend all forest management and road construction activities under its control in the Upper HCP Area within 1 mile of confirmed grizzly bear sightings for 21 days following the last confirmed sighting. Confirmation of grizzly bear sightings will be made by WDFW, USFWS, or TPU personnel trained in the identification of grizzly bears according to HCM 3-01K. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to minimize human displacement of grizzly bears from the upper Green River watershed.

Rationale and Ecosystem Benefits

As noted above, grizzly bears are particularly sensitive to the presence of humans. Human activity during summer months can cause grizzly bears to avoid specific areas, some of which may be important seasonal feeding areas. While it may be feasible to suspend human activities around fixed points, such as dens that grizzly bear will occupy for extended periods of time, it is not feasible to suspend all activities over broad areas during the summer when grizzly bears are active. Rather, Tacoma will implement restrictions around specific areas where grizzly bears are sighted, and the City will continue restrictions for periods of time sufficient to allow the animals to move unimpeded by the presence of humans.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04C

MEASURE: Grizzly Bears and Roads

Tacoma will not construct roads across non-forested blueberry fields (*Vaccinium* spp.) and black huckleberry fields (*Vaccinium membranaceum*), meadows, avalanche chutes, or DNR Type A or B wetlands in the upper Green River HCP Area.

Objective

The objective of this measure is to minimize the disturbance and/or destruction of key foraging habitats for grizzly bears.

Rationale and Ecosystem Benefits

Grizzly bears are known to avoid roads, particularly those with frequent or regular human use (USFWS 1997). Roads are a necessary component of a managed watershed, however, and cannot be excluded altogether from the Upper HCP Area. To minimize the potential for impacting grizzly bear activities with the presence of roads, Tacoma will construct no roads through areas of particular importance to grizzly bears. Berry fields, meadows, avalanche chutes, and wetlands make up a relatively small percentage of the Upper HCP Area, but they are important foraging areas for grizzly bears. Avoiding the construction of roads through these areas will substantially reduce the potential for road-related impacts to bears.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04D

MEASURE: Grizzly Bear Visual Screening

If grizzly bear presence is documented in the Green River Watershed, Tacoma will retain visual screens along the margins of preferred habitats (e.g., meadows, riparian areas, and berry fields) or along roads that are within 1 mile and in direct line of sight of preferred habitats. Visual screens at a minimum will consist of non-merchantable trees and shrubs, where they are available, which can obscure 90 percent of a grizzly bear standing on all four feet at a distance of 100 feet. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to minimize human displacement of grizzly bears from important foraging habitats in the upper Green River watershed.

Rationale and Ecosystem Benefits

As noted above, meadows, wetlands and berry fields are important feeding areas for grizzly bears, and human activity in or near these areas can cause bears to avoid them (Interagency Grizzly Bear Committee 1987). Disturbance-related impacts can be avoided by providing visual screening between roads and key feeding areas. This measure will provide that type of screening. Given that grizzly bears are currently quite rare in the Upper HCP Area, this measure will not take effect unless the presence of bears is documented. However, current management practices and native vegetative conditions in the Upper HCP Area are such that visual screening will exist along most roads throughout the term of the HCP, regardless of grizzly bear presence. This measure is simply an added layer of protection in the event that grizzly bear numbers increase in the future.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04E

MEASURE: Grizzly Bears and Trash

Tacoma will continue to take measures to prevent the dumping of putrescent trash that could attract grizzly bears. This will include: 1) restricting general public access to the upper Green River HCP Area below the town of Lester; 2) prohibiting City employees and other authorized watershed users from dumping or disposing of trash in the Upper HCP Area; and 3) cleaning up any newly discovered trash disposal sites in the Upper HCP Area as soon as possible. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to prevent grizzly bears in the upper Green River watershed from habituating to the scent and/or presence of humans.

Rationale and Ecosystem Benefits

As omnivores, bears are well known for their tendency to feed at human garbage dumps (Interagency Grizzly Bear Committee 1987). Grizzly bear use of garbage dumps is undesirable because it can cause bears to become habituated to the scent and presence of humans, and ultimately lead to interactions that necessitate the removal or destruction of individual bears. Conflicts can be avoided if garbage is controlled and disposed of properly.

The Upper HCP Area, as a municipal watershed, is closed to the general public. Permitted users in the Upper HCP Area are required to comply with stringent trash and garbage control policies (TPU 1993). Continued adherence to these policies, as described in this measure, will ensure there are no problem bear situations in the future.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04F

MEASURE: Grizzly Bears and Firearms

Tacoma will prohibit firearms within the vehicles of contractors working for Tacoma in the Upper HCP Area, except when being used for security purposes, for WDFW-approved hunts, or in conjunction with Native American Tribal hunting. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to prevent the unauthorized shooting of a grizzly bear in the upper Green River Watershed.

Rationale and Ecosystem Benefits

Unauthorized shooting of grizzly bears is a potential problem whenever this formidable creature comes into contact with humans. Shootings can be minimized by limiting the use of firearms by humans working in grizzly bear country. Certain individuals working in the Upper HCP Area (such as watershed patrols) may need to carry firearms, but all other persons under the jurisdiction of Tacoma will be prohibited from carrying firearms while in the area.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04G

MEASURE: Gray Wolf Den Site Protection

Tacoma will conduct no timber felling, yarding, road construction, blasting, or aerial application of pesticides within 1 mile of any known active gray wolf den from 15 March through 15 July. Tacoma will conduct no timber felling, yarding, road construction, blasting or aerial application of pesticides within 0.25 mile of any known active gray wolf "first" rendezvous sites from 15 May through 15 July. A "first" rendezvous site is the first such site used by a wolf pack after leaving the whelping den in the spring. Tacoma will contact the USFWS and WDFW prior to conducting harvest activities outside the denning season within 0.25 mile of a known den site to minimize management impacts on future den site use. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect denning gray wolves in the upper Green River watershed from human disturbance.

Rationale and Ecosystem Benefits

The gray wolf is extremely rare in Washington, but sightings have been made in the Cascade Mountains as far south as Randle, Washington (USFS 1998), and the species could use the Upper HCP Area on an occasional basis. Gray wolves use dens for six to 10 weeks in the spring and early summer if they are rearing pups. Once the pups are whelped, they are typically moved by the adults to a rendezvous site where they stay while the adults are hunting. They are sensitive to human presence during this entire time, and may abandon a den or rendezvous site if disturbed (USFWS 1987). The den site protection measures are consistent with current Washington Forest Practices Rules and Regulations for the protection of critical wildlife habitats (WAC 222-16-080[1][b]), and are generally considered adequate to avoid take of gray wolves during the denning season. Rendezvous site protection measures are added to this HCP to provide an additional disturbance buffer during that phase of wolf reproduction.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04H

MEASURE: Pacific Fisher Den Site Protection

Tacoma will conduct no timber felling, yarding, road construction, blasting, or aerial application of pesticides within 0.5 mile of any known active Pacific fisher den between 1 February and 31 July. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect denning Pacific fishers in the upper Green river watershed from human disturbance.

Rationale and Ecosystem Benefits

The fisher is rare throughout the western United States. Populations were severely depressed by trapping in the last century, and they have been slow to recover because of naturally low reproductive rates and a general loss of habitat to logging of old coniferous forest (Powell and Zielinski 1994). Management of the Natural and Conservation zones and riparian corridors in the Commercial Zone of the Upper HCP Area will, over time, create suitable denning habitat for the fisher (mature forest with large snags and logs), and the potential for fisher occurrence in the area will increase. Den site protection measures will be necessary in the HCP Area to ensure that human activities do not prevent the use of otherwise suitable habitat. While human activity has not been demonstrated as a significant factor in determining fisher use of an area, the importance of successful reproduction to the overall conservation of the species warrants measures such as Pacific fisher den site protection to limit human activity around established dens.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04I

MEASURE: California Wolverine Den Site Protection

Tacoma will conduct no timber felling, yarding, road construction, blasting, or aerial application of pesticides within 0.5 mile of any known active wolverine den between 1 October and 31 May. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect denning California wolverines in the upper Green River watershed from human disturbance.

Rationale and Ecosystem Benefits

The wolverine is a species of alpine and subalpine forests (Banci 1994), and may occur on an occasional basis in the upper reaches of the Green River watershed (USFS 1996). Tacoma lands in the Green River watershed are concentrated along the river (at the valley bottom), where wolverines are unlikely to occur, but den site protection measures are included in this HCP in the event that Tacoma acquires lands at higher elevations in the future. The wolverine is generally considered a wilderness species that avoids human contact, but recorded instances of wolverines in close association with humans raise

questions as to whether wolverines actually avoid humans or they simply prefer habitats that currently are not heavily exploited by humans (Banci 1994). Given the uncertainty as to wolverine sensitivity to human presence, it is considered prudent to include den site protection measures in this HCP.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04J

MEASURE: Canada Lynx Den Site Protection

Tacoma will conduct no timber felling, yarding, road construction, blasting or aerial application of pesticides within 0.25 mile of any known active Canada lynx den from 1 May through 31 July. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect denning Canada lynx in the upper Green River watershed from human disturbance.

Rationale and Ecosystem Benefits

The Canada lynx inhabits the boreal forests of Canada and Alaska, and extends south into the lower 48 states in the isolated areas where boreal forest conditions exist (Koehler and Aubry 1994). In Washington, the distribution of the lynx is largely restricted to high-elevation pine and spruce forests of eastern Washington (Johnson and Cassidy 1997), but rare sightings have been made in the Green River watershed (USFS 1996). The Upper HCP Area does not contain habitat typically considered suitable for the lynx, and it is not likely to in the future under the proposed management. Nevertheless, den site protection measures are included in this HCP to ensure that any dens that are documented in the area receive adequate protection. This measure is based on recommendations from the WDFW contained within the Washington DNR Lynx Habitat Management Plan (Washington DNR 1996).

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04K

MEASURE: Seasonal Protection of Peregrine Falcon Nests

Tacoma will conduct no timber felling, yarding, road construction, or aerial application of pesticides within 0.5 mile or blasting within 1 mile of any known active peregrine falcon nest from 1 March through 31 July. If an active nest fails or is otherwise found to be unoccupied after 1 June, seasonal protection will be removed for that year. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect peregrine falcon nest sites from human alteration and destruction.

Rationale and Ecosystem Benefits

Peregrine falcons nest on high cliff ledges or man-made structures (Cade et al. 1996), and hunt over large wetlands or marine shorelines (USFWS 1982). A number of peregrine falcon nest sites are known to occur in the Cascade Mountains, but currently there are none in the Green River watershed. The potential exists for nesting in the future because of the presence of several suitable cliff ledges and recent sightings of peregrine falcons flying through the area (USFS 1996). Like many large birds of prey, peregrine falcons are sensitive to human activity around nests (USFWS 1982). The disturbance avoidance measures included in the seasonal protection of peregrine falcon nests are consistent with current Washington Forest Practices Rules and Regulations for the protection of critical wildlife habitats (WAC 222-16-080[1][f]), and are generally considered adequate to avoid take of peregrine falcons during the nesting season.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04L

MEASURE: Long-Term Protection of Peregrine Falcon Nest Sites

Tacoma will conduct no timber felling or other habitat alteration within 100 feet of any known peregrine falcon nest site and all potential nest cliffs greater than 75 feet in height (measured horizontally) in the Upper HCP Area. During timber harvesting within 660 feet of known peregrine falcon nest sites, Tacoma will retain all “super dominant” trees (i.e., those dominant trees that are significantly larger and taller than the remaining trees in the stand, and extend above the dominant/codominant canopy). Retained super dominant trees will count toward meeting the snag and green recruitment tree requirements of Measure HCM 3-01G. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect nesting peregrine falcons in the upper Green River watershed from human disturbance.

Rationale and Ecosystem Benefits

As noted in seasonal protection of peregrine falcon nests, peregrine falcons currently do not nest in the Green River watershed, but the potential exists for nesting in the future. One cliff with suitable nesting ledges exists within the Upper HCP Area, and a buffer of

100 feet will be placed around the cliff to ensure that future timber harvesting activity will not remove any visual screening that may contribute to the suitability of the site. Beyond the visual screen, the retention of large super dominant trees up to 660 feet from nests will ensure a source of potential perch trees for adult peregrines during the nesting season. While there are currently no other areas considered suitable for nesting within the HCP Area, this measure will also provide for 100-foot buffers should peregrines establish nests in other atypical locations.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04M

MEASURE: Seasonal Protection of Bald Eagle Nests and Communal Winter Night Roosts

Tacoma will conduct no timber felling, yarding, road construction, or other habitat alteration within 0.25 mile (or within the direct line of sight, up to a minimum of 0.5 mile), no aerial application of pesticides within 0.5 mile and no blasting within 1 mile of any known active bald eagle nest from 1 January through 31 August and any know bald eagle communal winter night roost from 15 November through 15 March. Activity restriction around nests will apply 24 hours per day; activity restrictions around roosts will apply from one hour before sunset until one hour after sunrise. If eaglets have fledged from a nest prior to 31 August, seasonal protection will be removed for that year. If an active nest fails or is otherwise found to be unoccupied after 1 May, seasonal protection will be removed for that year. If wintering eagles fail to use a communal night roost in a given year, or vacate a roost prior to 15 March, seasonal protection will be removed for that year. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect nesting and roosting bald eagles in the upper Green River watershed from human disturbance.

Rationale and Ecosystem Benefits

Bald eagles are relatively common in western Washington (Smith et al. 1997), where they nest near large lakes, rivers and marine waters and spend the winter along rivers with anadromous fish runs (USFWS 1986). They do not currently nest or winter in the Upper HCP Area, but they are often seen in the area of Howard Hanson Reservoir. They could begin nesting or wintering in the area in the future if populations of fish and/or waterfowl increase. Winter feeding and roosting, if it occurs, will likely be in the Natural or Conservation zones where late-seral forest conditions will develop along larger water bodies. Additional measures to protect bald eagle winter use of the Upper HCP Area are

not necessary, particularly since it would occur during a season of relatively little human activity in the surrounding forest. Nesting, on the other hand, could occur in any of the zones where large trees are present, and would come at a time of year when potentially disturbing activities such as timber harvesting are taking place. Nest site protection measures are therefore included in this HCP to limit human disturbance of active bald eagle nests. These measures are generally consistent with current Washington Forest Practices Rules and Regulations for the protection of critical wildlife habitats (WAC 222-16-080[1][a]), and are designed to avoid incidental take of bald eagles during the nesting season.

Bald eagles also rely heavily on the use of communal winter night roosts in western Washington (Stalmaster 1987). These are typically areas of mature coniferous or deciduous forest with favorable microclimates and proximity to winter feeding areas. The specific requirements of communal roosts are not well understood, so emphasis is placed on protecting areas of known use. While no winter roosts are currently known to occur in the Upper HCP Area, there exists a potential for them to occur in the future as a result of increases in both bald eagle populations and fish populations in the Green River. This measure and the following measure (HCM 3-04N) will allow for the protection of roosts if they are established. Buffer distances are those recommended in the Recovery Plan for the Pacific Bald Eagle (USFWS 1986).

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04N

MEASURE: Long-term Protection of Bald Eagle Nests and Communal Winter Night Roosts

Tacoma will conduct no timber felling or other habitat alteration within ~~330~~ **400** feet of any known bald eagle nest or communal winter night roost in the Upper HCP Area. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect bald eagle nest and roost sites in the upper Green River watershed from human disturbance.

Rationale and Ecosystem Benefits

Adult bald eagles mate for life and typically return to the same nesting area year after year (Stalmaster 1987). They will use the same nest for several years, or alternate between two or more nests in the same general area. This behavior is not surprising, given the amount of energy required to construct a nest and the difficulty finding trees

with the appropriate size, structure, and location. Protection of existing nests in the non-nesting season is therefore considered important to the overall conservation of the species. The long-term protection of bald eagle nests will ensure that any bald eagle nests in the Upper HCP Area will be protected from habitat alteration during timber harvesting or other potentially disruptive activities.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04O

MEASURE: Seasonal Protection of Northern Spotted Owl Nests

Tacoma will conduct no timber felling, yarding, road construction, or aerial application of pesticides within 0.25 mile (1,320 feet) or blasting within 1 mile (5,280 feet) of the activity center of any known northern spotted owl pair from 1 March through 30 June, unless the spotted owls inhabiting the activity center have been found, through USFWS protocol surveys, to be non-reproductive or to have failed to successfully reproduce during a given year. Determinations as to the reproductive status of a given spotted owl pair will be made no earlier than 15 May of the year in question. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect nesting northern spotted owls in the upper Green River watershed from human disturbance.

Rationale and Ecosystem Benefits

The Green River watershed has been surveyed extensively for spotted owls since the federal listing of the species as threatened in 1990. There is one spotted owl activity center on Tacoma lands within the Upper HCP Area, nine activity centers within 0.7 mile of the Upper HCP Area and six more within 1.8 miles of the Upper HCP Area. Timber harvesting activities by Tacoma could influence the amount of habitat available to the spotted owls inhabiting these 16 activity centers and alter the behavior of some of the spotted owls at the activity centers closest to Tacoma lands.

Any short-term decreases in habitat for spotted owls that may result from timber harvesting in the Upper HCP Area will be more than offset in the mid- and long-terms by the development and maintenance of suitable nesting, roosting and foraging habitat throughout most of the Natural and Conservation zones. Roughly 78 percent of Tacoma's land is forested, and two-thirds of this (7,812 acres) is within the Natural and Conservation zones that will be managed specifically to promote and maintain late-seral forest habitat conditions for spotted owls. Extended harvest rotations (70 years),

extensive no-harvest riparian buffers, and increased rates of snag/green tree retention in the Commercial Zone will result in a significant portion of that zone functioning as habitat for spotted owls as well. Additional measures specific to the creation and maintenance of spotted owl habitat at the landscape level are not necessary.

Timber harvesting and related activities also have the potential to affect spotted owls by disturbing actively nesting pairs and causing them to interrupt or abandon nesting attempts. This situation will be avoided by implementing seasonal protection of the northern spotted owl which will require buffers of 0.25 mile around all known activity centers during the nesting season until it can be determined whether spotted owls are nesting. If nesting owls are present, protection will continue through the fledging and dispersal period for the young birds.

The *Protocol for Surveying Proposed Management Activities that May Impact Northern Spotted Owls* (USFWS 1992) specifies that determination of nesting status in a given year must be made prior to 1 June, and can be made as early as 16 April if the appropriate behaviors are observed. As a margin of certainty, Tacoma will conclude no determinations prior to 15 May. All determinations will be made according to the protocol developed by the USFWS (1992).

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04P

MEASURE: Long-Term Protection of Northern Spotted Owl Nests

Tacoma will conduct no timber felling or other habitat alteration within 660 feet of the activity center of any known northern spotted owl pair or resident single located in the Upper HCP Area, until it has been found, through USFWS protocol surveys, that a given activity center has been unoccupied for at least 36 months. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect northern spotted owl nests in the upper Green River watershed from human alteration and destruction.

Rationale and Ecosystem Benefits

As noted in the seasonal protection of the northern spotted owl, potential nesting habitat for spotted owls will be created and maintained with no even-aged harvesting on over 52 percent of the Upper HCP Area. Management of the Commercial Zone (approximately 20 percent of the Upper HCP Area) will emphasize commercial timber production, but

extended rotations (70 years), wide no-harvest riparian buffers, and snag/green tree retention measures will create the potential for spotted owl nesting in this zone as well. It is the intention of this HCP to promote spotted owl nesting in the Natural and Conservation zones, while minimizing the impacts to nesting owls in the Commercial Zone. The long-term protection of northern spotted owl nests will minimize the effects of timber harvesting near nest sites in the Commercial Zone by retaining approximately 31 acres of forested buffer around nest sites until they are abandoned. It is not expected that 31 acres will be sufficient habitat to support long-term nesting if the adjacent habitat is harvested, but when combined with the high overall amount of habitat throughout the Upper HCP Area, it will minimize direct impacts to nesting spotted owls and allow for transition of displaced owls to unoccupied habitat elsewhere in the area. Tacoma will not monitor all known spotted owl activity centers in all years, but Tacoma will monitor known activity centers according to USFWS (1992) protocol prior to any determinations of status change.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04Q

MEASURE: Seasonal Protection of Northern Goshawk Nests

Tacoma will conduct no timber felling, yarding or road construction within 0.25 mile, no aerial application of pesticides within 0.5 mile, and no blasting within 1 mile of any known active northern goshawk nest from 1 March through 31 August. If an active nest fails or is otherwise found to be unoccupied after 1 June, seasonal protection will be removed for that year. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect nesting northern goshawks in the upper Green River watershed from human disturbance.

Rationale and Ecosystem Benefits

The Green River watershed, including the Upper HCP Area, contains several thousand acres of forest habitat capable of supporting nesting and hunting by northern goshawks. Given the number of recent sightings in the watershed (USFS 1996), it is likely they occur in the Upper HCP Area. Management under the HCP will result in increases in suitable habitat for goshawks in all three zones, so there is an even higher likelihood that nesting will occur in the future. Goshawks will continue to use forest habitat in all three management zones of the Upper HCP Area under the proposed management because of the high density of mid- and late-seral forest that will occur, even in the Commercial Zone. Even-aged harvests (i.e., clearcuts) will not preclude the presence of goshawks if

the overall density of forested habitat is adequate, but harvesting activities could displace goshawks if they are conducted too close to active goshawk nests. To minimize impacts to nesting goshawks, Tacoma will implement the seasonal buffers described in the seasonal protection of northern goshawk nests.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04R

MEASURE: Long-Term Protection of Northern Goshawk Nests

Tacoma will conduct no timber felling or other habitat alteration within 660 feet of any known active northern goshawk nest in the Upper HCP Area, unless it has been determined that the nest has been unoccupied for at least eight consecutive years. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect northern goshawk nests in the upper Green River watershed from human alteration and destruction.

Rationale and Ecosystem Benefits

Goshawks will nest and hunt in managed forest landscapes if there is a sufficient density of suitable habitat (Reynolds et al. 1992). They are also known to nest in relatively young forest (≥ 40 years old) (Bosakowski and Vaughn 1996) if it contains at least a few trees of sufficient size to support nests. The Natural Zone will be free of timber harvesting, and should provide nesting opportunities for goshawks throughout the term of the HCP. Timber harvesting in the Conservation Zone will be uneven-aged and infrequent, and should not lead to nest site abandonment by goshawks if the area immediately surrounding the nest is protected. Timber harvesting in the Commercial Zone, while it will be even-aged, will involve small units and infrequent harvest entries. Again, long-term presence of nesting goshawks may be possible if the habitat immediately around nest trees is maintained. This habitat conservation measure will provide for long-term protection of nest sites, and should help ensure the continued presence of goshawks in the Upper HCP Area.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04S

MEASURE: Pileated Woodpecker Nest, Roost, and Foraging Trees

Tacoma will give preference to leaving green recruitment trees with visible signs of pileated woodpecker nesting, roosting, and/or foraging when selecting snags and trees to meet other HCMs. Persons authorized to select snags and green recruitment trees

will be instructed in how to identify signs of pileated woodpecker use. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect and enhance habitat for the pileated woodpecker in the upper Green River watershed.

Rationale and Ecosystem Benefits

Pileated woodpeckers are common in western Washington, but their numbers are probably reduced from historic levels as a result of habitat loss. They are particularly susceptible to conventional forest practices because of their need for large dead trees (snags) for foraging, nesting and roosting (Bull and Jackson 1995). Snags are typically removed during commercial timber harvesting to satisfy concerns for worker safety and fire prevention. Large snags are hard to replace in subsequent managed stands because most even-aged rotations are not long enough to grow trees of the size required by pileated woodpeckers. A number of measures in this HCP will act to avoid the effects of conventional forestland management and maintain habitat for pileated woodpeckers. Specifically, the retention of all existing forest habitat in the Natural Zone, the management for late-seral conditions in the Conservation Zone, the maintenance of wide no-harvest buffers on fish-bearing streams and smaller no-harvest buffers on all other streams, and the retention of large numbers of snags and residual green recruitment trees in conjunction with all timber harvesting will provide large trees and snags across most of the Upper HCP Area. The pileated woodpecker nest, roost, and forage tree habitat conservation plan is intended to focus on green recruitment trees so that the trees selected for retention at the time of commercial timber harvesting provide the maximum benefit to pileated woodpeckers. Persons responsible for selecting and marking trees to be left will be trained in the identification of pileated use so that these features can be preserved in the Upper HCP Area.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04T

MEASURE: Vaux's Swift Nest and Roost Trees

Tacoma will give preference to leaving green recruitment trees with visible signs of current Vaux's swift nesting and/or roosting and those with the potential for future use when selecting snags and trees to meet other HCMs. Tacoma will attempt to leave other green recruitment trees clumped around trees with signs of Vaux's swift use to protect the swift trees from windthrow and moderate microclimates at potential roosts. Persons authorized to select snags and green recruitment trees will be instructed in

how to identify signs of Vaux's swift presence as well as snags and trees with the potential for future use. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to protect and enhance habitat for the Vaux's Swift in the upper Green River watershed.

Rationale and Ecosystem Benefits

The Vaux's swift uses a wide range of managed and unmanaged forest habitats for foraging, but it is very specific in its selection of nest and roost sites; it requires large, hollow ("chimney") snags (Bull 1991) or large decadent trees with pileated woodpecker cavities or natural hollows (Bull and Cooper 1991). Under conventional forest management, these snags and decadent trees are considered hazards to worker safety and forest fire prevention, and so are felled. They are rarely replaced under the short, even-aged rotations typical of the Pacific Northwest, so they can subsequently become limiting factors to the presence of the Vaux's swift. The snag, green recruitment tree, and log retention measure will ensure that large snags and large green recruitment trees are left at the time of harvesting in the Upper HCP Area, and the Vaux's swift nest and roost tree measure will direct the selection of green recruitment trees to with the most potential benefit to the Vaux's swift.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04U

MEASURE: Larch Mountain Salamander Habitat Protection

Tacoma will survey potential Larch Mountain salamander habitat prior to activities that might substantially reduce forest canopy and/or result in substantial disturbance to the substrate. Areas that are surveyed and found to be occupied by Larch Mountain salamanders will be protected as described below. For purposes of this conservation measure, potential habitat is defined as: a) coniferous forest over 100 years of age, or b) any site with greater than 0.25 acre of contiguous substrate of exposed, coarse unconsolidated substrate, regardless of the vegetative cover.

Activities that might substantially reduce forest canopy, remove or disturb coarse woody debris, and/or result in substantial disturbance to the substrate will be preceded by surveys for Larch Mountain salamanders if they are to be conducted in potential habitat. These activities include: a) clearcut harvesting, b) salvage logging, c) commercial thinning, d) new road construction, e) road reconstruction that involves work outside the existing road prism, and f) creation of new rock/gravel extraction sites. The continued use and/or expansion of existing rock/gravel extraction sites will not require surveys.

Potential habitat surveys and habitat protection will occur according to the following steps:

1. **Potential habitat (as defined above) will be surveyed prior to the activities listed above. Surveys will follow 1999 USFS protocol (Crisafulli 1999).**
2. **Potential habitat found to be occupied by Larch Mountain salamanders during surveys will be protected and buffered with 50-foot no-harvest buffers. Except as noted below, none of the activities listed above will occur within the occupied habitat or the buffer.**
3. **The total area protected (including buffer) within any one planned activity area (e.g., harvest unit or planned road segment) will not exceed 10 percent of the total planned activity area. When occupied habitat covers more than 10 percent of the planned activity area, Tacoma and the USFWS will determine which areas will receive protection.**
4. **New roads will be re-routed around occupied Larch Mountain salamander habitat unless alternate road locations would substantially increase the total miles of roads in the affected area, or if alternate locations would have greater impacts to fish, wildlife or water quality.**

Objective

The objective of this measure is to minimize impacts to Larch Mountain salamanders and their habitat in the upper Green River watershed during the course of road construction and other forest management activities.

Rationale

The Larch Mountain salamander is a little-known species that appears to have a strong association with coarse substrates, where it resides in the cool, moist spaces between rocks (Nussbaum et al. 1983; Leonard et al. 1993). Recent evidence also suggests the salamander finds habitat beneath coarse woody debris in mature and late-seral coniferous forest (Crisafulli 1999). Habitats of this type often occur in widely scattered patches across the landscape, and it is not known how quickly disturbed habitats can be re-occupied by salamanders from other patches of potential habitat. It is therefore considered important to protect all significant patches of potential habitat, at least until more is known about the habitat requirements, dispersal abilities and full geographic distribution of the species.

A number of other Habitat Conservation Measures will result in the protection of potential Larch Mountain salamander habitat. HCM 3-01B will protect several thousand acres of habitat in the Natural Zone, including several hundred acres of mature upland coniferous forest in the upper reaches of the watershed. HCM 3-01C

will provide similar protection to coniferous forest stands over 100 years old in the Conservation Zone. HCM 3-01J will protect upland sites with low productivity (several of which are on coarse, rocky soils) as UMAs, and HCM 3-02A will protect several hundred acres of upland forest that may be potential Larch Mountain salamander habitat along streams. The only areas not covered by these other measures are the lands in the Commercial and Conservation zones that will be subject to commercial timber harvesting, road construction and gravel extraction. HCM 3-04U will cover these areas.

All areas of potential habitat (as defined above) will be surveyed for Larch Mountain salamanders, and protected from disturbance if found to be occupied. Certain areas and activities will be explicitly or implicitly excluded from the survey requirement. Forest stands less than 100 years old will not require surveys because they have less residual woody debris, and thus less potential for supporting Larch Mountain salamanders (Crisafulli 1999). Contiguous areas of coarse soil less than 0.25 acre in size will not require surveys because they collectively amount to a small amount of potential habitat, but they could result in a substantial amount of survey effort. Areas subject to salvage harvesting from roads will not require surveys because the potential for ground disturbance will be negligible. Lastly, existing rock and gravel extraction sites are excluded from the survey requirement because they are already being developed as gravel sources (disturbed sites) and these facilities are essential to the proper maintenance of roads in the watershed. There are currently 11 developed rock/gravel extraction sites on the covered lands, for a total of 26 acres. The closing of an existing rock/gravel extraction site would require the opening of another, and likely result in greater overall impact. Conversely, the total amount of potential Larch Mountain salamander habitat represented by these developed sites is small.

~~HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04U~~

~~MEASURE: Larch Mountain Salamander Habitat Protection~~

~~Tacoma will conduct no timber harvesting, yarding, road construction, or aerial application of pesticides, herbicides, or fertilizers in forested talus fields of 1.0 acre or larger and within 100 feet (average distance) of unforested talus fields of 0.5 acre or larger in size. All existing roads through forested talus fields of 1.0 acre or larger and unforested talus fields of 0.5 acre or larger will be abandoned if alternate roads are available. For purposes of implementing this measure, forested talus fields shall mean areas of unconsolidated rock with forest overstory canopy closure less than or equal to 30 percent, and unforested talus shall mean unconsolidated rock slopes. An unforested talus field shall end at the treeline where there is clearly evidence of a~~

~~forest talus edge. Talus extending into the forested stand beyond this edge shall be considered forested talus, and not subject to the buffering requirement of this measure. When delineating buffers around unforested talus fields, consideration shall be given to topographic features and the aspect that best protects the microclimate in and around the talus field, with preference given for retaining trees on the south and west sides. Tacoma will fund all the costs associated with this measure.~~

~~Objective~~

~~The objective of this measure is to protect Larch Mountain salamander habitat in the upper Green River watershed from human alteration and destruction.~~

~~Rationale and Ecosystem Benefits~~

~~The Larch Mountain salamander is a little-known species that appears to have a strong association with talus substrates (Nussbaum et al. 1983; Leonard et al. 1993) where it resides in the cool, moist spaces between the rocks. Habitats of this type often occur in widely disjunct patches across the landscape, and it is not known how quickly disturbed habitats can be re-occupied by salamanders from other patches of suitable habitat. It is therefore considered important to protect all significant patches of suitable habitat, at least until more is known about the habitat requirements, dispersal abilities and full geographic distribution of the species. HCM 3-04U will provide for the protection of all talus patches that are at least 0.5 acre in size. Protection of smaller patches would be difficult to administer (because of the difficulty finding and delineating them).~~

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04V

MEASURE: Sightings of Covered Species

Tacoma will notify the USFWS in a timely manner of any reported sighting of a spotted owl, marbled murrelet, grizzly bear, gray wolf, Pacific fisher, California wolverine, or Canada lynx in the Upper HCP Area. Tacoma will fund all the costs associated with this measure.

Objective

The objective of this measure is to assist the USFWS and other responsible resource agencies in the effective management of federally-listed species in the upper Green River watershed.

Rationale and Ecosystem Benefits

The spotted owl, marbled murrelet, grizzly bear, gray wolf, Pacific fisher, California wolverine, and Canada lynx are all rare in the Washington Cascades. Each confirmed sighting of these species is important to ongoing conservation and recovery efforts. The USFWS, which coordinates recovery efforts for listed species, should be informed as quickly as possible for any occurrences so that appropriate research and management actions can be taken.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04W

MEASURE: Seasonal Protection of Occupied Marbled Murrelet Nesting Habitat

Tacoma will conduct no timber felling, yarding, or road construction within 0.25 mile, no aerial application of pesticides within 0.5 mile, and no blasting within 1.0 mile of habitat where "occupancy" by nesting marbled murrelets has been documented, in habitat where "presence" of marbled murrelets has been reported but occupancy status has not been determined**, and in suitable nesting habitat that has not been surveyed for marbled murrelets**. This avoidance measure will be implemented all times of day from 1 April through 5 August, and from 1 hour before sunrise and 2 hours after sunrise and 1 hour before sunset until 1 hour after sunset from 6 August through 15 September. Tacoma will fund all costs associated with this measure.

Objective

The objective of this measure is to protect nesting marbled murrelets in the upper Green River watershed from human disturbance.

Rational and Ecosystem Benefits

Marbled murrelets recently have been detected in the upper Green River Watershed, and "occupancy" behaviors have been observed on federal lands adjacent to the Covered Lands. "Occupancy" is presented to indicate nesting, according to the Pacific Seabird Group (PSG) survey protocol (Ralph et al. 1994). While the effects of human activity on nesting marbled murrelets are not well understood, it is assumed that disturbance of the type created by logging, road construction, and the use of low-flying aircraft can contribute to nest failure. Tacoma anticipates no harvest of suitable marbled murrelet nesting habitat on the Covered Lands during the term of the ITP, but management activities on the Covered Lands could occur near occupied marbled murrelet nesting habitat on adjacent lands. This mitigation measure will avoid disturbance-related impacts to nesting marbled murrelets on and near the Covered Lands. **All information available to Tacoma, including the results of marbled murrelet surveys conducted by**

neighboring landowners, will be used to determine when and where this measure should be applied.

HABITAT CONSERVATION MEASURE NUMBER: HCM 3-04X

MEASURE: Site-Specific Protection of Northwestern Pond Turtles

Tacoma will develop site-specific protection plans to minimize impacts to Northwestern pond turtles if the turtles are found to occur on or near the Covered Lands and it is determined that one or more of the covered activities has the potential to impact the turtles. Protection plans will be prepared in cooperation with the WDFW, USFWS, and NMFS and will address only the performance of Covered Activities on the Covered Lands.

Objective

The objective of this measure is to protect Northwestern pond turtles and their habitat on the covered lands from human alteration and destruction.

~~*Objective*~~

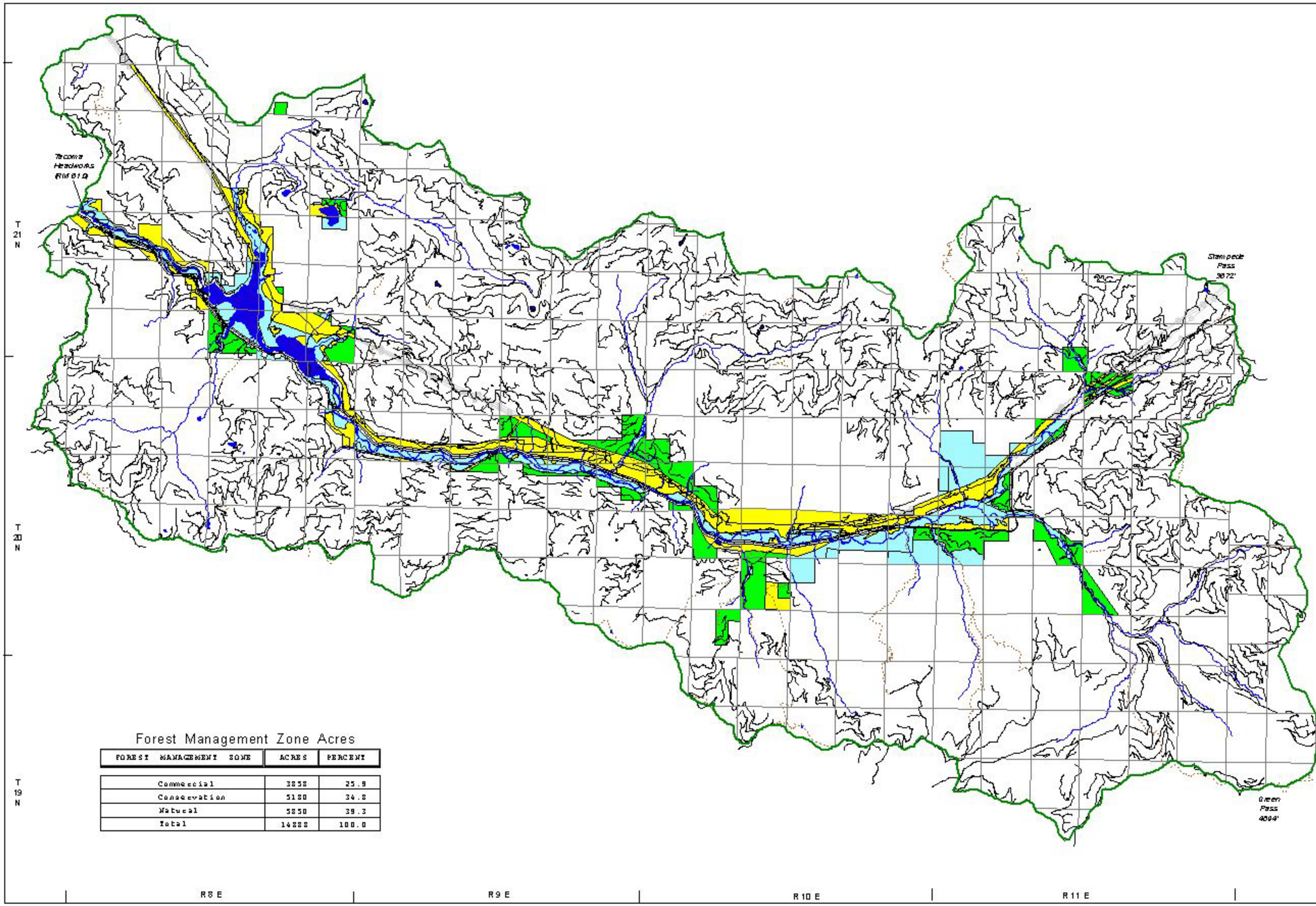
~~The objective of this measure is to protect denning California wolverines in the upper Green River watershed from human disturbance.~~

Rationale and Ecosystem Benefits

Northwestern pond turtles are not currently believed to occur on or near the Covered Lands, but the potential exists for them to occur in the future. The development of site-specific protection plans in coordination with the appropriate agencies offers the best opportunity for effective mitigation.

Literature Cited

References cited in this chapter are provided in Chapter 10 of the HCP. Chapters 5, 6, and 8 of the HCP contain the primary commitments of Tacoma in support of its application for an ITP. The Underline and Strikeout versions of HCP Chapters 5, 6, and 8 are included in the FEIS to identify changes in the Draft HCP that were made in response to public comments and additional analyses conducted by the Services. A final HCP, including an updated list of references cited in each chapter, will be issued when the Services have reached a decision regarding issuance of an ITP.



Forest Management Zone Acres

FOREST MANAGEMENT ZONE	ACRES	PERCENT
Commercial	3858	25.9
Conservation	5180	34.8
Natural	5850	39.3
Total	14888	100.0

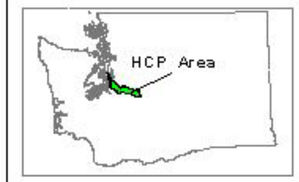


Figure 5 - 4.

Tacoma City Water
Green River Watershed
Forest Management Zones

Legend

- Upper Watershed Boundary
- Public Land Survey
- Railroad
- Road
- Trail
- Streams
- Water Body
- Commercial Zone
- Conservation Zone
- Natural Zone
- Pipeline
- Powerline

N

Scale = 1:126,720

1 0 1 2

Scale in Miles

1 inch = 2 miles

Source: Tacoma Water GIS

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6. Monitoring and Research Program

Monitoring and evaluation of the habitat conservation measures identified in Chapter 5 is integral to the success of this HCP. Monitoring is required to ensure measures are implemented according to specified standards. Measures must also be evaluated to ensure the results conform to expectations. In some cases, conservation measures are innovative or experimental in nature and may require testing that potentially leads to adaptive management to achieve desired results. Monitoring and evaluation of the habitat conservation measures provide the Services the certainty that the measures achieve the anticipated level of impact minimization and mitigation required under Section 10 of the Endangered Species Act.

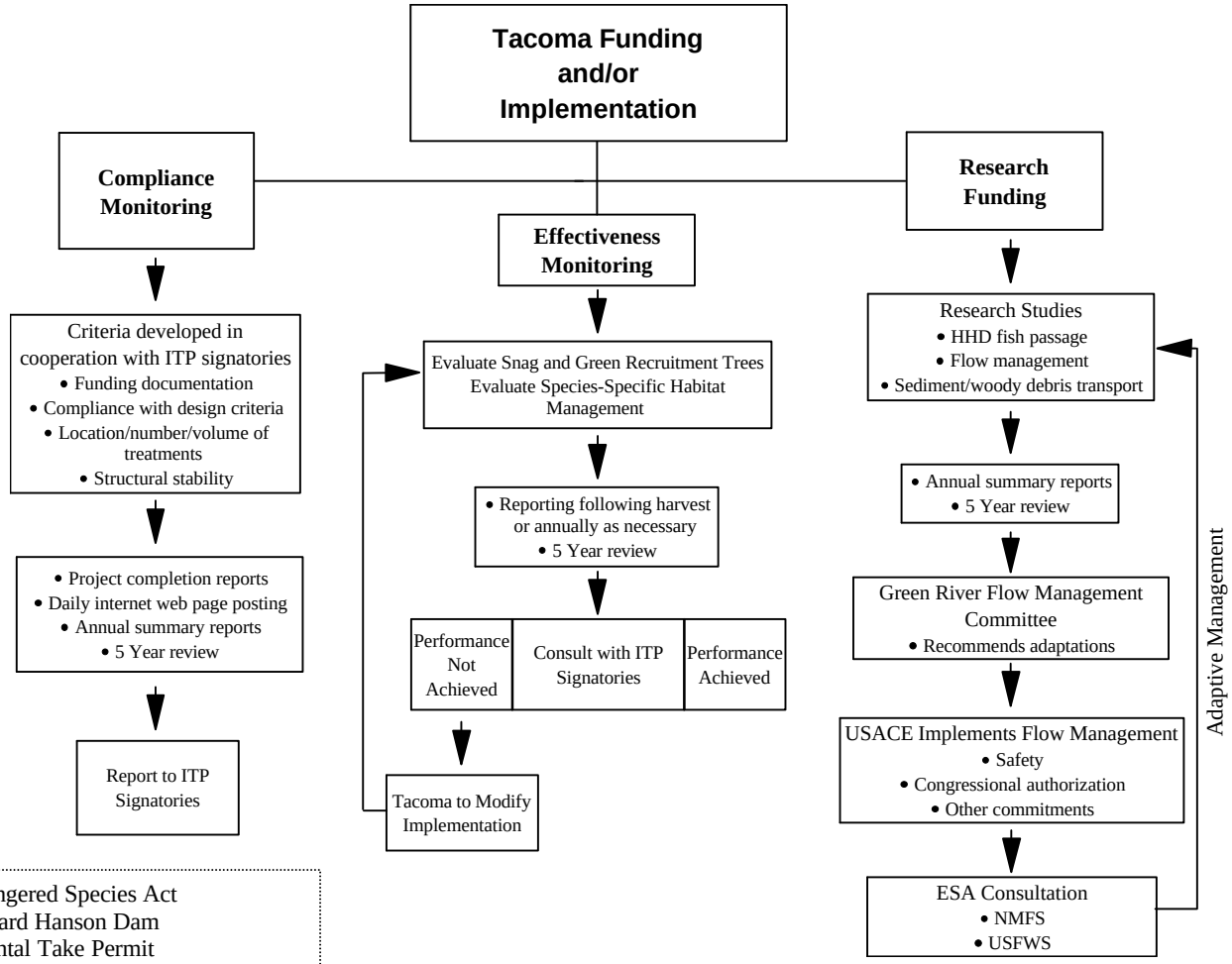
This chapter describes monitoring and research measures that Tacoma has agreed to fund solely or jointly (in conjunction with the U.S. Army Corps of Engineers [1] (USACE) and other federal agencies) as part of this HCP. The measures have been subdivided into three major types: compliance monitoring to ensure conservation measures are implemented according to specified standards; effectiveness monitoring to provide feedback to improve performance and functionality of measures where Tacoma is responsible for ensuring results; and research designed to provide resource agencies and the Muckleshoot Indian Tribe (MIT) information needed to adaptively manage the natural resources of the Green River on a real-time basis (Figure 6-1). Monitoring will continue for the duration of the **Incidental Take Permit** (ITP), or until full compliance with the criteria and commitments identified in the following sections is achieved.

Compliance Monitoring

Compliance monitoring measures are designed to provide documentation to the Services that the conservation measures have been implemented as specified in the HCP. Compliance criteria, developed in cooperation with the Services, ensure that:

- engineered structures, such the fish ladder and fish screens meet design criteria;

[1] The cost-share percentages referenced in this document between Tacoma Water and the USACE are subject to changes in the Water Resource Development Act or other Congressional funding initiatives, which may adjust the cost-share formula between the parties.



ESA = Endangered Species Act
HHD = Howard Hanson Dam
ITP = Incidental Take Permit
NMFS = National Marine Fisheries Service
USACE = U.S. Army Corps of Engineers
USFWS = U.S. Fish and Wildlife Service
ITP Signatories = NMFS and USFWS

Figure 6-1. Monitoring and research program provided by City of Tacoma's Green River HCP.

- the number, size, location and stability of stream rehabilitation measures such as woody debris, sediment, and vegetation plantings satisfy specified commitments;
- management activities within the HCP area comply with specified constraints or restrictions; and
- resource utilization, such as water withdrawals and timber harvest, are accomplished within established limitations.

Evidence of compliance with the HCP requirements will be documented through a combination of project completion reports, internet web page postings, or annual summaries. Compliance will be evaluated at five-year intervals in cooperation with the Services. Provided that Tacoma has implemented the measures as specified, no further action will be necessary beyond reporting requirements specified in individual measures. Funds required to implement compliance monitoring will be provided by Tacoma solely or in conjunction with other funding agencies. Cost-reductions identified through increased efficiencies, competitive bids, or coordinated efforts with ongoing project operations will accrue to Tacoma or other funding agencies.

Effectiveness Monitoring

Monitoring and adaptive management are a process for combining scientific research with applied management. It is used to address uncertainty about the response of natural ecosystems to management activities while management continues (Halbert 1993). Under an adaptive management process, management actions are treated as a series of experiments, and the results of those “experiments” are scientifically analyzed and used to guide future management.

Effectiveness monitoring measures are used to evaluate whether conservation measures have achieved the specified resource objective. The end result of effectiveness monitoring is to facilitate adaptations if the original measure proves inadequate. Effectiveness monitoring for this HCP includes only those management activities for which uncertainty exists regarding the outcome, and which Tacoma has complete responsibility. Effectiveness monitoring of conservation measures undertaken as part of the AWS project will be addressed by the USACE and the Services during Section 7 consultation. Tacoma’s participation as local sponsor and via this HCP is limited to providing partial funding to support necessary monitoring and adaptive management. Adherence to funding commitments will be documented as part of compliance monitoring.

Criteria for effectiveness monitoring measures included as part of this HCP will be developed in coordination with the Services. The results of effectiveness monitoring activities will be reviewed in coordination with the Services at five-year intervals, and if necessary, conservation measures that are judged to be ineffective will be modified. Effectiveness monitoring activities will continue until the Services are satisfied that the measures are achieving the desired resource objective.

Funds required to implement effectiveness monitoring for this HCP will be provided solely by Tacoma. Cost-reductions identified through increased efficiencies, competitive bids, or coordinated efforts with ongoing project operations will accrue to Tacoma.

Research

Conservation measures for which there is currently little biological uncertainty (e.g., screening criteria at Tacoma's Headworks) will be implemented as described in this HCP, with compliance monitoring to ensure implementation of the measure. Where Tacoma is responsible for ensuring effectiveness of a measure (e.g., snag creation), effectiveness monitoring and adaptive management will be implemented. Research is a third category under Tacoma's Green River monitoring and research program and represents the majority of the funding commitment.

Tacoma has committed to several conservation measures associated with facilities operated by other parties (e.g., USACE operation of HHD). Tacoma has also committed to conservation measures where resource agencies and the MIT have been provided the opportunity to identify and recommend adaptive management options with the approval of the NMFS and USFWS (e.g., springtime refill at HHD). For conservation measures where agencies and the MIT are responsible for adaptively managing a resource, Tacoma has committed to funding research to provide them with feedback on the results of their actions.

Tacoma may modify implementation of the HCP, if requested by the NMFS and USFWS, based on the results of the research measures. Tacoma may also modify implementation of the HCP, if requested by the NMFS and USFWS, based on the consensus of the USACE and the Green River Flow Management Committee. However, any modifications to the conservation measures identified in the HCP shall not represent additional commitments of money, water, or other resources without the consent of Tacoma. Recommendations by the USACE and the Green River Flow Management Committee regarding implementation of the HCP or the USACE's operation of HHD cannot preclude or restrict Tacoma's ability to withdraw water to an extent greater than that agreed to as part of HCMs 1-01 and 1-02 in Chapter 5 of the HCP.

Within the financial limitations described in Chapter 8, Tacoma agrees to fund all or part of the various research activities. A research fund will be established by Tacoma as part of this HCP to allow research activities to continue through the 50-year term of the HCP (see Chapter 8). The research fund will allow flexibility in the apportionment of funds between research efforts as new information becomes available and research priorities change. Cost-savings identified through increased efficiencies, competitive bids, or coordinated efforts with other monitoring programs (e.g., King County restoration efforts) will accrue to the research fund. Should funds in excess of the financial commitments identified in Chapter 8 be required to evaluate project impacts or potential restoration measures, the funds must come from sources other than the City of Tacoma.

Annual funding of the research efforts will begin immediately following construction of the HHD Additional Water Storage project (AWS project). During the first ten years of the AWS project, the research fund will be managed by the USACE. During this initial period, the Green River Flow Management Committee will recommend the design and implementation of research activities to the USACE. The USACE will distribute funds or implement the research studies pending approval of the NMFS and the USFWS. During or following this initial ten-year period, the USACE and the City of Tacoma may designate an alternate agency to manage the research fund pending approval of the NMFS and the USFWS. An independent scientific panel could also be formed to guide research activities pending approval of the NMFS and the USFWS.

The intent of the research fund is to allow the NMFS and the USFWS, and with their approval the Green River Flow Management Committee, the opportunity to design and implement an annual Green River research program. In the absence of recommendations of the Green River Flow Management Committee, Tacoma is committed to implementing the monitoring and research program described in this HCP. Details of the research program have been identified in the following section. Additional details will be developed in coordination with the NMFS and USFWS, the USACE, and the Green River Flow Management Committee during the preliminary engineering and design phase of the AWS project. The USACE and Tacoma may modify the research program, in coordination with the Green River Flow Management Committee, provided the NMFS and USFWS concur. Any modification to the research program shall not represent additional commitments of money, water, or other resources without the consent of Tacoma. Tacoma's monetary commitment is identified in Chapter 8 of this HCP.

Based on the results of the research, the Green River Flow Management Committee can recommend adaptations in the USACE's water storage and release schedule for Howard

Hanson Dam. However, responsibility for operation of Howard Hanson Dam, including the reservoir storage and release schedule, lies with the USACE. The USACE, in turn, must comply with project purposes as identified by congressional authorization and must abide by NMFS and USFWS direction through Section 7 consultation under the Endangered Species Act.

Research will address three primary areas of uncertainty:

1) downstream fish passage at HHD (including reservoir and dam passage);
2) flow management in the middle and lower Green River; and
3) sediment and woody debris transport in the mainstem Green River.

Downstream Fish Passage at Howard Hanson Dam

Potential restoration of anadromous fish production above the USACE's Howard Hanson Dam is one of the primary conservation measures of this HCP. While restoration of anadromous fish production to the upper Green River watershed offers great promise, achieving the full benefit of fish passage restoration measures will require close monitoring and evaluation of the downstream passage of salmonids as they enter and pass through the reservoir and dam. Achieving successful downstream passage will require research and evaluation to balance successful passage of outmigrating salmonids through Howard Hanson Dam and reservoir with potentially conflicting requirements to protect downstream fish and wildlife resources.

A variety of measures have been proposed as part of the AWS project to evaluate and monitor outmigrating salmonids. Monitoring measures proposed as part of the AWS project include using nets to sample juvenile salmonids as they enter the reservoir, hydroacoustic surveys to identify fish distribution as they pass through the reservoir and dam, and operation of fish sampling facilities to recapture marked fish to assess passage survival. Tacoma's commitment under this HCP is to provide funding support for downstream fish passage research as local sponsor of the AWS project. Some details of the proposed downstream fish passage-monitoring plan have been identified, but additional details will be developed during the pre-construction engineering and design (PED) phase of the AWS project. The results of research and evaluation measures will be used by the resource agencies and MIT to recommend modifications to the proposed storage and refill rules governing operation of Howard Hanson Dam. Viable contingencies include changes to storage timing, refill rate, duration of refill and route of water released from HHD.

Both the USACE and Tacoma have committed to funding downstream fish passage research measures as part of the AWS project. Tacoma's commitment under this HCP will be to fund a portion of the research effort as the local project sponsor. Through the first ten years following construction of the AWS project, Tacoma will provide funding support for downstream fish passage research measures at the level identified in Chapter 8 of this HCP. Funding support for downstream fish passage research during years 11 through 50 of the AWS project must be provided by other funding entities. Should funds in excess of those identified in Chapter 8 be necessary to fully examine downstream fish passage issues during the first ten years of the AWS project, funds must be acquired from cost-savings or re-apportionment from other monitoring measures or by conducting monitoring on a more infrequent but more intensive schedule.

Flow Management

Tacoma is seeking a federal permit under the Endangered Species Act to cover water withdrawals associated with supplying municipal water to regional customers. One effect of these water withdrawals is to alter streamflow in the mainstem Green River below Tacoma's Headworks. To provide resource agencies and the MIT with information to better manage instream resources, Tacoma has committed to funding a series of flow management research measures. Flow management research measures identified in this HCP include identifying the physical and biological relationships between mainstem, lateral and side-channel habitats in the middle Green River, identifying the timing and location of spawning salmon and steelhead, and sampling outmigrating juvenile salmonids to identify their outmigration timing, distribution, and survival.

Flow management research measures will provide the NMFS and USFWS and other members of the Green River Flow Management Committee with the knowledge and opportunity to better manage flows and fisheries in the Green River. Using the results of the research measures, they can adaptively manage the Green River flow regime and recommend changes in the storage and release of water from HHD to benefit instream resources. Potential flow management opportunities include maintenance of alternate base flows, capture or release of freshets, and flow augmentation to protect steelhead redds or side channel rearing areas. Many details of the proposed flow management research program are described in this HCP. Additional details will be developed in coordination with the USACE, Services, MIT, WDFW, and King County during the preliminary engineering and design phase of the AWS project.

Some of the flow management research measures contained in this HCP represent joint funding efforts by the USACE and Tacoma as part of the AWS project. Other measures represent commitments by Tacoma as part of prior agreements with the MIT. As described in Chapter 8 of this HCP, Tacoma's commitment to flow management research is to fund a portion of the research effort through the first ten years following construction of the AWS project. Within the funding limits identified in Chapter 8, Tacoma will also provide complete funding for flow management research measures during years 11 through 50 of the AWS project. Should funds in excess of those identified in Chapter 8 be necessary to fully examine specific aspects of flow management issues, funds must be acquired from cost-savings or re-apportionment from other research measures, or by conducting research on a less frequent but more intensive schedule.

Flow management research activities identified in this HCP will be complementary to ongoing salmon and steelhead spawning surveys and other monitoring activities conducted by state and tribal fisheries managers. Streamflow, channel configuration, biotic indices, and water quality parameters are also monitored by various federal, state and local jurisdictions responsible for flood control, public health, and the environment. Coordination with other entities will be critical to maximizing the benefits of conservation measures identified in this HCP (see following section on Basin-Wide Coordination).

Sediment and Woody Debris Transport

The original construction and continued operation of the USACE's HHD interrupts the delivery of gravel-sized and larger sediments and woody debris to the middle and lower Green River. Tacoma and the USACE, as part of the AWS project, have committed to placing quantities of gravel-sized sediments and woody debris below Tacoma's Headworks. The intent is to restore a measure of the natural transport function lost by construction and operation of HHD. Tacoma's commitment, as identified in Chapter 5 of this HCP, is limited to transport and placement of specified quantities of material. Tacoma's gravel and woody debris conservation measures do not commit to a specified level of conservation performance. For instance, Tacoma's gravel nourishment conservation measure stipulates that the addition of 3,900 yd^3 of gravel may be insufficient to fully restore sediment transport functions in the Green River. Tacoma's commitment for sediment and woody debris research is also limited to a specified contribution of funds.

Sediment and woody debris research will identify the amount and composition of sediment and woody debris materials stored in the middle Green River downstream of the input sites. Assuming approval of the Services, information gathered through research efforts will be made available to the Green River Flow Management Committee to allow resource managers to evaluate sediment and woody debris transport alternatives. Potential changes to the sediment and woody debris measures include adaptations to the timing, location, and method of placement of sediments and woody materials. Through the first ten years following construction of the AWS project, Tacoma will provide funding support for sediment and debris transport research as identified in Chapter 8 of this HCP. Should additional funds be necessary to examine sediment or woody debris transport on a basin-wide scale, or if additional funds are needed to expand the evaluation of biological effectiveness, funds must be acquired from cost-savings or re-apportionment from other research measures or by conducting research on a more infrequent but more intensive schedule.

Basin-Wide Coordination

Tacoma presently owns lands that make up about ten percent of the upper Green River watershed, or about five percent of the entire Green River basin (Ryan 1996, Wiggins et al. 1995). Plum Creek Timber Company, U.S. Forest Service, Washington State, King County, Weyerhaeuser, Boeing, and the cities of Auburn, Kent, and Tukwila also own or have jurisdiction over large portions of the Green River basin. In response to the listing of Puget Sound chinook under the Endangered Species Act, many of these entities are committing to increased monitoring efforts to evaluate the effect of their activities on listed species. The widespread interest in monitoring Green River natural resources offers the opportunity to optimize efforts through coordination. Coordination also helps avoid duplication of effort and may provide the opportunity to combine funds to address basin-wide issues or to shift monitoring funds to areas of greatest need.

Collaboration and coordination of monitoring efforts is especially important when addressing issues that extend beyond the immediate effects of a single agency or landowner. Rehabilitation of natural stream processes may involve solutions with potentially significant ramifications. For instance, the sediment transport regime in the Green River is affected by almost all landowners in the basin. The original construction and operation of the Howard Hanson Dam was a combined effort of the USACE and King County. Howard Hanson Dam presently blocks the downstream transport of gravel-sized and larger sediments. While Howard Hanson Dam serves to trap sediment, historic forestry practices in the upper watershed have changed the rate of sediment

delivery into the Howard Hanson Reservoir. Efforts to re-initiate gravel transport below HHD must not only consider the historic and future rate of sediment movement from the upper watershed, but must also consider the existing and future rate of sediment contributions from downstream tributaries. Land use practices in sub-basins such as Newaukum, Soos, Springbrook, and Mill Creeks have changed the rate and size distribution of sediments supplied to the mainstem Green River downstream of HHD. While individual landowners and jurisdictional agencies may affect only a small portion of the basin, each contributes to a basin-wide problem.

Increasing the rate of sediment supply to the Green River below HHD may affect the channel capacity in the lower river. Downstream landowners will want assurances that their needs for flood protection are addressed. The effect of placing sediment below HHD may also change depending on the change in sediment contribution from lower basin tributaries. Rehabilitation of the Green River sediment transport regime is but one example of the benefits of basin-wide coordination in developing solutions to natural resource issues.

In addition to enhancing the cost-effectiveness and efficiency of monitoring efforts, coordination among various parties in the Green River basin would help ensure that management actions support complementary restoration goals. Tacoma's conservation measures identified in Chapter 5 provide the opportunity to protect ecosystem functions in the middle and lower watershed, and to restore anadromous fish production to the upper watershed. As described in Chapter 4, flood control, urbanization, timber harvest, hatchery practices, fisheries harvest, and land-use changes will all influence the effectiveness of measures implemented by Tacoma to protect and restore ecosystem functions. The relative success of conservation measures will be determined not only by Tacoma's implementation of those measures, but by water control, land-use, and natural resource management decisions outside the control of the City. Recovery of Green River ecosystem functions to the extent practicable within the present land-uses of the basin will require coordination with tribal, federal, state and local jurisdictions with resource management responsibilities.

While decisions regarding the operation of Howard Hanson Dam are ultimately the responsibility of the USACE and the Services (through Section 7 consultation), Tacoma believes that establishment of a Green River basin coordinating committee would enhance the synergistic benefits of conservation measures identified in Chapter 5. However, the establishment of such a committee is not the responsibility of Tacoma, and is therefore beyond the scope of this HCP. An ad hoc committee of tribal, state, and federal agency representatives presently coordinate fish harvest and hatchery

management decisions. An informal Green River Flow Management Committee also exists to review and coordinate flow management decisions with the USACE. A basin-wide coordinating committee could address the interaction of instream flow, habitat, harvest, and hatchery issues in the Green River, and be instrumental in maximizing the resource benefits of the conservation measures provided in this HCP. Such a committee could be set up as part of the WRIA 9 planning process or similar mechanisms.

One objective of a Green River basin coordinating committee might be to manage basin-wide monitoring and evaluation programs. Tacoma has structured the monitoring and research program to complement a central committee should one be developed at a later date. The research program is expressly designed so that, with the approval of the NMFS and USFWS, a basin-wide committee can direct annual research funds. In the absence of a formal basin-wide coordinating committee, Tacoma will implement the monitoring and research program as specified in the HCP.

The following sections contain descriptions of individual compliance, effectiveness, and research measures. Each measure has been given an identification number consisting of letters designating the type of monitoring (e.g., CMM for Compliance Monitoring Measure) followed by a two-digit number (e.g., CMM-01). In some cases, there are multiple components for a given monitoring measure; these are given a separate letter code and individually described.

Tacoma recognizes that the sampling and collection of any fish species within the Green River watershed is predicated upon having a valid scientific collection permit issued by the Washington Department of Fish and Wildlife (WDFW). Furthermore, the collection of any federally listed fish species will require acquisition of a federal recovery permit as specified under section 10(a)(1)(A) of the ESA. Prior to initiating any of the monitoring measures that involve fish sampling, Tacoma will obtain all necessary collection permits and authorizations from state and federal resource agencies and Tribes, and will report findings of such samplings in accordance with permit requirements.

Reporting

Reports describing the results of all Compliance, Effectiveness, and Research Monitoring efforts will be submitted to the Services. To minimize repetition, the following text identifies only the Services as primary recipients of monitoring data and reports. However, it is expected that Tacoma or the Services will provide copies of specific reports to other federal, state, and local governments and Indian Tribes who will

participate in coordination activities or who could provide meaningful comments and review. Copies of relevant reports will also be submitted to all state or local agencies with regulatory control over actions undertaken as part of monitoring (e.g., WDFW, as the agency in charge of issuing Hydraulic Project Approvals [HPA], will receive copies of all reports describing proposed or completed instream habitat restoration activities).

The reporting format and schedule for each monitoring or research measure are listed in the summary tables for Sections 6.1, 6.2, and 6.3. Unless otherwise indicated, the results of all monitoring will be summarized and presented to the Services during meetings convened at five-year intervals (five-year reviews). Again, to avoid repetition, the text and tables identify only the Services as participants in five-year reviews. However, contingent upon approval by the Services, Tacoma expects to invite participation in the five-year reviews by the USACE, WDFW, WDOE, WDNR, MIT, King County, and the GRFMC (or a comparable group if one is established). It is expected that the Services will provide copies of monitoring reports and materials distributed at the five-year reviews to those organizations and to other interested parties.

6.1 Compliance Monitoring

A brief description of Compliance Monitoring Measures (CMMs), monitoring criteria, measurement frequency, reporting requirements, and contingencies are described in Table 6-1. Tacoma's specific commitments associated with each measure are contained within a series of outlined textboxes that are presented following the table. The supporting rationale for each monitoring measure is also provided following individual textboxes. All monitoring activities will be summarized in writing and presented to the Services during reviews at five-year intervals. Individual monitoring measures may require more frequent reporting. Monitoring data will be maintained by Tacoma, and will be made available to the Services upon request. Provided that Tacoma has implemented the measures as specified, no further action will be necessary beyond reporting requirements specified in individual measures. Funds required to implement compliance monitoring will be provided by Tacoma solely or in conjunction with the USACE. Cost-reductions identified through increased efficiencies, competitive bids, or coordinated efforts with ongoing project operations will accrue to Tacoma or other funding agency.

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-01	Minimum Instream Flow Monitoring	• Green River discharge at Palmer and Auburn available	• Daily	• Post on web page or equivalent public access database	
		• Water supply information available (water diversions and well withdrawal)	• Daily	• Post on web page or equivalent public access database	
		• Document that use restrictions have been implemented if minimum flows in the Green River are lowered to 225 cfs during drought conditions	• As needed	• Written notification to the Services	
		• No water withdrawn under SDWR when flows are < 200 cfs at Palmer or < 400 cfs at Auburn between 15 July and 15 September.	• Daily	• Post on web page or equivalent public access database • Summary plots and tables at 5-year reviews	
		• No water withdrawn under SDWR when flows are < 300 cfs at Palmer between 16 September and 14 July	• Daily	• Post on web page or equivalent public access database • Summary plots and tables at 5-year reviews	
		• Pumping rates are less than the rate required to prevent stage declines in an identified adult salmonid holding area in the North Fork Green River of more than 1-inch per hour between 1 July and 31 October	• Hourly when pumping occurs	• Post on web page or equivalent public access database • Summary plots and tables at 5-year reviews	

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-01	Minimum Instream Flow Monitoring (cont.)	• Pumping occurs only when turbidity approach or exceed 5 nephelometric turbidity unit's at the Tacoma Headworks	• Daily	• Post on web page or equivalent public access database • Summary plots and tables at 5-year reviews	
CMM-02	HHD Non-Dedicated Water Storage and Flow Management Monitoring	• Data on quantity of water in non-dedicated, dedicated water supply and dedicated flow augmentation available	• Daily	• Post on web page or equivalent public access database • Summary plots and tables provided to GRFMC monthly from 1 February to 1 July • Report to the Services at 5-year reviews	
CMM-03	Tacoma Headworks Rehabilitation Monitoring	**SITE NO. 1** • Number of pieces of LWD placed: 48 (including at least 6 but no more than 18 rootwads) • LWD species: fir, hemlock, cedar, or spruce • LWD length ≥20 ft • LWD diameter (minimum) ≥12 inches • Rootwad: diameter at base of bole ≥18 inches • Rootwad: stem length ≥ 3ft • Boulder size: b-axis ≥ 4 ft	• One-time post-construction	• Project completion report provided to the Services within 6 months of completion	

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-03	Tacoma Headworks Rehabilitation Monitoring (cont.)	• Stability Alignment has changed < 20º Location has shifted < 5 meters = 16.4 ft (LWD) or < 2x diameter for boulders Anchor materials intact LWD sound; limited rot or decay Material size similar to installed; no fragmentation	• Inspect in years 1, 3, and 5; thereafter following flows ≥ 20-year flow event as measured at HHD	• Inspection data available on request • Results reported at first 5-year review and 5-year reviews following 20-year flow events	• Repair or replace as needed during first 5 years; funds available for one replacement during years 6-50
		SITE NO. 2			
		• Number of pieces of LWD placed: 5 • LWD species: fir, hemlock, cedar or spruce • LWD length ≥ 20 ft • LWD diameter (minimum) ≥ 12 inches • Rootwad: diameter at base of bole ≥18 inches • Rootwad: stem length ≥ 3 ft • Boulder size: b-axis ≥ 4 ft	• One-time post-construction	• Project completion report provided to the Services within 6 months of completion	
		• Stability Alignment has changed < 20º Location has shifted < 5 meters = 16.4 ft (LWD) or < 2x diameter for boulders Anchor materials intact LWD sound; limited rot or decay Material size similar to installed; no fragmentation	• Inspect in years 1, 3, and 5; thereafter following flows ≥20-year flow event as measured at HHD	• Inspection data available on request • Results reported at first 5-year review and 5-year reviews following 20-year flow events	• Repair or replace as needed during first 5 years; funds available for one replacement during years 6-50

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-04	Tacoma Headworks Upstream Fish Passage Facility Monitoring	• Meets facility design criteria developed in cooperation with NMFS, USFWS,WDFW, and MIT prior to construction	• One-time post-construction	• Project completion report provided to the Services	
		• Documentation of daily number and species transported, release locations, and mortality	• Annual	• Results reported at 5-year reviews	• Modify hauling operations or timing in the event of mortality
		• Confirm adults find and enter ladder by identifying presence/absence of adult anadromous salmonids below the Headworks during trap and transport operations	• Years 1 and 2, survey every 7 days during mid-September to mid-November, and April-May	• Results reviewed annually for ladder entrance modifications; reported at 5-year review	• Modify ladder entrance
		• **Confirm that re-introduction of anadromous fish does not pose a risk to public health through degradation of drinking water quality**	• **Daily at the Headworks and weekly at select locations in the upper watershed**	• **Results reviewed annually; increased frequency if public health issues are identified**	• **Contract with independent expert to coordinate with the Services to evaluate options before reducing upstream passage of adult fish**
CMM-05	Tacoma Headworks Downstream Fish Bypass Facility Monitoring	• Meets facility design criteria developed in cooperation with NMFS, USFWS,WDFW, and MIT prior to construction	• One-time post-construction	• Project completion report provided to the Services	• Install baffles or otherwise modify facility to meet design criteria

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-06	Monitor the Distribution of Juvenile Fish Released Upstream of HHD	• **Confirm that debris that collects on trash rack and fish screen are passed downstream**	• **Volume of debris manually removed from the trash racks and screens will be recorded as part of maintenance operations as site conditions require**	• **Results will be reported to the Services annually and summarized at the first two 5-year reviews**	
		• **Confirm that modified Headworks spillway is configured to minimize risk of injury to downstream migrants**	• **Spillway passage tests will be conducted within two years of completion of Headworks modifications**	• **Results will be reported to the Services within 6 months of completed tests**	• **Modify Headworks spillway and/or plunge pool conditions**
		• Documentation of funding or implementation of transport and release (if measure is implemented) Map of release sites Record of number, species, and size of fish released per site	• Record of release process provided to MIT within one week of fish transport	• Financial records available to the Services on request • Results will be reported to the Services annually and summarized at 5-year reviews	

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-07	Side Channel Restoration Signani Slough Monitoring	• Meets facility design criteria developed in cooperation with NMFS, USFWS,USACE, WDFW, and MIT prior to construction	• One-time post-construction	• Project completion report provided to the Services within 6 months of completion	
		• Stability for anchored pieces Alignment has changed < 20° Location has shifted < 5 meters is 16.4 ft (LWD) or < 2x diameter for boulders Anchor material, if used, intact LWD sound; limited rot or decay Material size similar to installed Inlet capacity reduced < 20%	• Inspect in years 1, 3, and 5; thereafter following flows ≥ 20-year flow event as measured at HHD	• Inspection data available on request • Results reported at first 5-year review and 5-year reviews following 20-year flow events	• Repair or replace as needed during first 5 years; funds available for one replacement years 6-50
CMM-08	Mainstem Woody Debris Management Monitoring	**LWD ACCOUNTING** • Maintain record of: No. of pieces removed from reservoir No. of pieces for downstream passage No. of pieces for other HCP restoration No. of pieces available for other projects • Copy of LWD availability notification (if applicable)	• Annual update	• Data available to the Services on request; summarize at 5-year reviews	

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-08	Mainstem Woody Debris Management Monitoring (cont.)	**UNANCHORED LWD PLACEMENT** • Annual downstream LWD allocation: At least 5 pieces (if available) or 50% of total collected, whichever is greater • Location of wood placement sites • Number of truckloads of small woody debris (up to 5) • Number of pieces of LWD placed • Diameter of LWD: ≥ 1 ft • Length of LWD: ≥ 12 ft	• Annual inspection until all LWD is transported	• Placement data available to the Services on request • Results reported at 5-year review	
		ANCHORED LWD PLACEMENT (if applicable) • Location of wood placement sites • Individual piece or collective volume > 11 yd^3 • Stability Alignment has changed < 20° Location has shifted < 16 ft Anchor material intact LWD sound; limited rot or decay • Material size similar to installed	• One-time post-construction • Inspect in years 1, 3, and 5; thereafter following flows ≥ 20-year flow event as measured at HHD	• Project completion report provided to the Services • Inspection data available on request • Results reported at first 5-year review and 5-year reviews following 20-year flow events	
CMM-09	Mainstem Gravel Nourishment Monitoring	• Location of gravel placement • Volume of gravel placed: ≤ 3,900 yd^3	• Annual inspection of placement sites following high flows	• Purchase records and placement data available to the Services on request • Results reported at 5-year review	

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-10	Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Monitoring	**HABITAT REHABILITATION (various locations)**			
		• LWD species: fir, hemlock, cedar • LWD (side channels and tribs): Length ≥ 20 ft Diameter ≥ 12 in. Diameter of rootball ≥ 3 ft Frequency (site average) ≥ 2 pieces/channel width • LWD large channels (> 65 ft wide) Volume of piece or group ≥11 yd^3 • Meets design criteria developed in cooperation with NMFS, USFWS, USACE, WDFW, and MIT prior to construction	• One-time post-construction	• Project completion report provided to the Services within 6 months of completion	
		• Stability (all locations) Alignment of LWD structures changed < 20° Location has shifted < 16 ft (LWD) or < 2x diameter for boulders Anchor material intact LWD sound; limited rot or decay Material size similar to installed; no fragmentation	• Inspect in years 1, 3, and 5; thereafter following flows ≥ 20-year flow event as measured at HHD	• Inspection data available on request • Results reported at first 5-year review and 5-year reviews following 20-year flow events	• Repair or replace as needed during first 5 years; funds available for one replacement during years 6-50
		VEGETATION IN INUNDATION POOL			
		• Year 1: ≤ 10% mortality of all plantings • Year 5: ≤ 20% mortality of all plantings • Year 10: ≤ 50% mortality of all plantings • No increase in the percent cover of invasive non-native species in any year	• Single inspection in years 1, 3, 5, 7, 10	• Inspection data available on request; • Results summarized for 5-year reviews in years 5 and 10	• Replant as needed • Implement weed control treatment

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-10	Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Monitoring (cont.)	**FISH PASSAGE BARRIERS**			
		• Location of barrier culverts	• Year 1	• Map provided to the Services within 6 months following completion of inventory	
		• Treatment prioritization	• Year 2	• List provided to the Services by end of year 2	
		• Culvert design criteria from WDFW (1999)	• As needed	• Records of design calculations, culvert specifications, and post-construction inspection will be maintained and provided to the Services on request	• Repair or replace as needed
				• Culvert replacement activities will be reported 5-year review	

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-11	Snowpack and Precipitation Monitoring	• Data on Green River snowpack and precipitation available on public access database	• Daily November through June	• Post on web page on equivalent public access database • Summary plots provided at GRFMC meetings • Report to the Services at 5-year reviews	• Adopt improved measurement technology if it becomes available at a comparable cost
CMM-12	Upland Forest Management Monitoring	**ALL HARVEST UNITS**			
		• Current copy of standard written notification provided to contractors and loggers	• Update as needed	• Presented at first 5-year review and subsequent reviews if modified	
		• Douglas-fir 50-year site index > 80	• Annual summary	• Documentation to the Services on request	
		• At least four green recruitment trees retained per acre (including at least 2 conifer if present) including: 1 ≥ 20" dbh (if present) 1 ≥ 16" dbh (if present) 2 ≥ 12" dbh (if present)	• Inspect and map one year after harvest	• Results summarized at 5-year reviews	
		• At least 6 snags per acre are retained	• Inspect and map following harvest and at 10-year intervals	• Documentation provided to the Services annually on request • Results summarized at 5-year reviews	• Adjust rate of snag recruitment in coordination with the Services

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-12	Upland Forest Management Monitoring (cont.)	**UNEVEN-AGE HARVESTING**			
		• No harvest of conifer stands > 100 years old in Conservation Zone	• Annual summary	• Documentation provided to the Services annually on request	
		• Unit size ≤ 120 acres	• Annual summary		
		• On average, area harvested annually accounts for < 1% of total area in conifer dominated stands in Conservation Zone/year	• Calculated at end of each 5-year reporting period	• Results summarized at 5-year reviews	
		• Planted with 50 to 100 shade tolerant conifers per acre	• Single inspection one year after harvest		• Replant

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-12	Upland Forest Management Monitoring (cont.)	**EVEN-AGE HARVESTING** • Units located only in Commercial Zone • On average, accounts for ≤ 1.5% of the conifer dominated stands in Commercial Zone/Year	• Annual summary • Calculated at end of each 5-year reporting period	• Documentation provided to the Services annually on request	
		• Minimum age of conifer dominated stand at harvest = 70 years	• Annual summary • Annual summary	• Results summarized at 5-year reviews • Documentation provided to the Services annually on request	
		• Unit size ≤ 40 acres	• Single inspection one year after harvest	• Documentation provided to the Services annually on request	• Replant
		• Planted with 300 to 400 Douglas-fir, western hemlock, western redcedar, or true fir seedlings per acre		• Documentation provided to the Services annually on request • Results summarized at 5-year reviews	

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
		SALVAGE HARVEST			
		• Unit size ≤ 120 acres	• Annual summary	• Documentation provided to the Services annually on request	
CMM-12	Upland Forest Management Monitoring (cont.)	**HARDWOOD CONVERSION**			
		• Conducted only in Commercial or Conservation zone	• Annual summary	• Documentation provided to the Services annually on request	
		• Planted with 300 to 400 Douglas-fir, western hemlock, western redcedar, or true fir seedlings per acre	• Single inspection one year after harvest	• Results summarized at 5-year reviews	• Replant
CMM-13	Riparian Buffer Monitoring	• Average no-harvest buffer width (based on at least 10 measurements at intervals ≤100 ft) Type 1 and 2 waters = 200 ft Type 3 waters = 150 ft Type 4 waters = 50 ft **up to 100 ft** Type 5 waters = 25 ft	• Single inspection within one year of harvest	• Raw data provided to the Services annually on request • Results reported at 5-year reviews	
		• Average partial-harvest buffer width (based on at least 10 measurements at intervals ≤100 ft; start at outer edge of no-harvest zone) Type 3 waters = 50 ft Type 5 waters = 25 ft	• Single inspection within one year of harvest	• Raw data provided to the Services annually on request • Results reported at 5-year reviews	

Table 6-1. Compliance monitoring to be implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement Frequency	Reporting	Contingency
CMM-14	Road Construction and Maintenance Monitoring	• No net increase in permanent road miles **in the Natural Zone** over term of HCP **OR** if increase has occurred over reporting period, TPU will identify roads to be abandoned in the future to ensure compliance	• Calculated at end of each 5-year reporting period	• Results reported at 5-year reviews	
		• Location and configuration of new roads as specified by Watershed Analysis prescriptions	• Single inspection at time of construction	• Documentation provided to the Services annually on request	
CMM-15	Species-Specific Habitat Management Monitoring	• No new roads in berry fields, meadows, avalanche chutes and wetlands	• Annual	• Maps available on request; results reported at 5-year reviews	
		• No harvest within 100 ft of talus fields	• Annual	• Maps available on request; results reported at 5-year reviews	
		• Record of grizzly bear sitings, gray wolf dens, Pacific fisher, California wolverine, Canada lynx provided by watershed inspectors	• Record sightings as they occur; immediate notification of the Services	• Sightings data sheets available on request	• Implement Species-Specific HCMs
		• Annual check with USFWS area biologist and WDFW Priority Habitats database	• Annual	• Results reported at 5-year reviews	• Implement Species-Specific HCMs

6.1.1 Compliance Monitoring Measure CMM-01 Minimum Instream Flow Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-01

MEASURE: Minimum Instream Flow Monitoring

CMM-01A - Mainstem Green River

Before water can be withdrawn or stored under the Second Diversion Water Right (SDWR), Tacoma shall ensure that the Muckleshoot Indian Tribe (MIT) and federal and state resource agencies have access to the U.S. Geological Survey (USGS) streamflow database, or equivalent source, for the purpose of monitoring streamflow conditions at the Palmer, Washington, (USGS # 12106700) and Auburn, Washington (USGS # 12113000), gage stations (Tacoma 1995). Tacoma shall ensure instream flow levels are measured on a daily basis, as noted under the conditions specified in the Muckleshoot Indian Tribe/Tacoma Public Utilities Agreement (MIT/TPU Agreement), and at both the Palmer and Auburn, Washington gages. The results of such monitoring shall document that Tacoma has taken all steps necessary to comply with seasonal restrictions on the SDWR and the instream flow requirements stipulated in the MIT/TPU agreement. Should Tacoma exercise the option to lower minimum flows to 225 cfs at the Auburn gage during drought conditions, written documentation that water use restrictions have been implemented will be provided to the Services.

Tacoma will make the results of the above monitoring available to the MIT and interested federal and state resource agencies. Furthermore, Tacoma shall also update its system of flow monitoring, as mutually agreed upon by the MIT and federal and state resource agencies, consistent with advances in data transfer technology. As part of this monitoring, Tacoma shall also provide system water supply information (e.g., well and municipal reservoir levels), as requested by MIT and federal and state resource agencies (Tacoma 1995). It is anticipated that access to these data will be provided through an Internet home page with daily updates on reservoir and river conditions.

CMM-01B – North Fork Well Field

Tacoma shall maintain records of withdrawals from the North Fork well field, including the rate of withdrawal on an hourly basis. In addition, daily turbidity values measured at the RM 61.5 Headworks will be maintained. Records of well withdrawals and turbidity readings will be made available to the Services upon request to document compliance.

The results of a study to identify the physical effect of the rate of well field pumping on stage changes in the lower North Fork channel will be provided to the NMFS and USFWS within two years following signing of the ITP. The study must be designed and completed in cooperation with the NMFS and USFWS and submitted to the MIT and local, state, and other federal resource agencies for review and comment. The results of the study will be used to assess the maximum rate of pumping that maintains a pumping-related stage reduction of no greater than one inch per hour in an area of

potential adult salmonid holding refugia the lower North Fork channel. Following completion of the study, documentation of compliance with the 1 July through 31 October ramp rate restrictions will be provided through maintenance of hourly pumping records.

Surveys of adult salmonids holding in the North Fork Green River downstream of the North Fork well field will be conducted during the late summer and fall to quantify the resource potentially at risk. The presence of adult fish in the North Fork Green River downstream of the North Fork well field will be evaluated by pedestrian surveys conducted every 10 days between 1 September and 31 October. Surveys will be conducted for the first five years following completion of the Tacoma Headworks upstream passage facility. The results of these surveys will be reported at the first five-year review, and will be made available to the Services on request.

Objective

Document compliance with minimum flows, water withdrawal restrictions, and pumping rates by making streamflow data and system water supply information available on an Internet home page or other public access database.

Rationale

Mainstem Green River. Tacoma has diverted water from the Green River since 1913, under the First Diversion Water Right claim (FDWRC). Tacoma's FDWRC is not subject to the state of Washington's 1980 minimum instream flow (Caldwell and Hirschey 1989). In 1986, Tacoma was granted an additional water right, the Second Diversion Water Right (SDWR) from the Washington Department of Ecology (Ecology) for up to 100 cfs. In 1995, Tacoma entered into an instream flow agreement with the MIT that conditioned the use of its water rights on minimum flows set forth in the MIT/TPU Agreement (Tacoma 1995). In order to meet this agreement, Tacoma must provide access to USGS streamflow data in the Green River on a daily basis during periods of water withdrawal.

This CMM will be implemented to document that Tacoma is taking all necessary steps to ensure the flow requirements of the MIT/TPU Agreement as described in Table 6-1 and Chapter 5 are met. Information will be available on demand from an Internet web-site or other public access database that is updated daily. Summary plots and tables describing water withdrawals and instream flows will be presented at five-year reviews.

North Fork Well Field. In general, pumping from the North Fork well field occurs during the late fall, winter and spring when streamflow and turbidity are highest. However, periods when well withdrawals would be required to meet drinking water standards have

been documented to occur during September (Noble 1969), at a time when well withdrawals have the potential to impact cool water refugia in the lower North Fork Green River. As part of CMM-01, records of well field use and turbidity readings from the mainstem Green River will ensure that the well field is only used when needed to maintain water quality and protect public health. Documentation of stage changes in response to pumping and information on use of the affected reach by adult salmonids will be used to quantify the resource at risk and assess the magnitude of that potential risk.

6.1.2 Compliance Monitoring Measure CMM-02 Howard Hanson Dam Non-Dedicated Water Storage and Flow Management Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-02

MEASURE: Howard Hanson Dam Non-Dedicated Water Storage and Flow Management Monitoring

Tacoma has agreed to provide funding support to distribute data for development of an enhanced springtime operating strategy for HHD. Tacoma will post data on the amount of water available for non-dedicated storage, water dedicated to municipal supply, and water dedicated to flow augmentation for instream resources on the web page. A summary of this data will be provided to the Green River Flow Management Committee (GRFMC) on a monthly basis from 1 February through 1 July, and will be presented to the Services during regularly scheduled five-year reviews.

Objective

Provide data on the amount of water available in the dedicated and non-dedicated blocks of water stored in Howard Hanson Reservoir storage to facilitate flow management by the Green River Flow Management Committee (GRFMC).

Rationale

Tacoma is the local sponsor of the Howard Hanson Dam-Additional Water Storage project, and will support the USACE and GRFMC in developing an enhanced springtime operating strategy for HHD. The springtime storage and release strategy will involve management of dedicated and non-dedicated blocks of water that will be used to benefit fisheries resources, as described in HCM 2-02 (Section 5.2.2). To that end, Tacoma has committed to ensuring that data on the quantity of water in non-dedicated, dedicated water supply and dedicated flow augmentation blocks is available to the GRFMC. Providing data on the amount of water in the various storage allocations will assist the GRFMC evaluate management decisions and recommend in-season adjustments.

6.1.3 Compliance Monitoring Measure CMM-03 Tacoma Headworks Rehabilitation Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-03

MEASURE: Tacoma Headworks Rehabilitation Monitoring

A number of rehabilitation structures (consisting primarily of large woody debris [LWD] and rootwads) will be placed in the Headworks inundation pool to **improve habitat conditions in the reach inundated by** ~~offset environmental impacts associated with~~ the raise in the pool inundation zone. These structures will be monitored to determine their longevity and ability to withstand high flows. The stability of the structures will be assessed using criteria based on the alignment, location, extent of fragmentation or decay, and condition of anchoring materials. Structures that are deemed non-functional as a result of high flows will be modified or replaced by Tacoma as needed within the first five years following construction. Tacoma will also fund one complete replacement within the term of the HCP should deterioration of the materials or flood damage make such an action necessary. The physical stability of the structures will be evaluated in years one, three and five following construction, and after all flows that have a return interval of ≥20 years as measured at HHD.

Objective

Evaluate the physical condition and stability of rehabilitation structures installed in the Headworks inundation pool to confirm that they meet design criteria, and remain stable.

Rationale

The benefits of using LWD to rehabilitate salmonid habitat are well documented (House and Boehne 1986; House et al. 1991; Murphy 1995). For this reason, HCMs that involve placement of LWD are assumed to be effective provided they remain stable and function as intended. Therefore, monitoring for this HCP will be limited to documentation that the structures comply with design and performance criteria.

Design criteria for the Tacoma Headworks Rehabilitation Measure are described in detail in the Final Second Supply Project Comprehensive On-Site and Off-Site Fish Mitigation report (CH2M Hill 1996). LWD specifications call for a total of 48 pieces of LWD to be placed at two sites within the Headworks reach. The number of pieces required is based on achieving a desired frequency of two pieces per channel width within the Headworks Reach. Large woody debris must be fir, hemlock, cedar or spruce. Logs will have a minimum diameter of 12 inches and be at least 20 feet long. Rootwads will have a

diameter of at least 18 inches at the base of the bole, and a stem that is at least 3 feet long. These pieces are less than the minimum size or volume that qualifies as a “key” piece in the mainstem Green River channel, which is greater than 100 feet wide in the Headworks Reach. However to enhance stability, the LWD will be placed in groups of three to five logs, and attached to each other and to a placed boulder that has a minimum diameter of four feet. At Site 1, which consists of a large point bar, approximately 10 boulders (minimum diameter 4 ft) will be placed at the upstream end to dissipate the energy of high flows sweeping across the bar. At Site 2, five single logs will be placed at the outside of a meander bend, and attached to each other and to boulders that have been placed on the bank.

Compliance with the design criteria will be documented by a one-time inspection of each rehabilitation site immediately following construction. The condition and stability of each structure will be assessed using general criteria developed by Gaboury and Feduk (1996). Structures will be judged stable if they remain within 16.4 feet (5 meters) of their original location, their alignment has changed less than 20 degrees, anchor materials and connections are intact, and the LWD is sound with little rot, decay, or fragmentation. The stability of each rehabilitation structure will be evaluated through field inspections conducted one, three, and five years after construction. Performance criteria established in the HPA require that all structures must be able to withstand 100-year peak flows. To this end, Tacoma will also inspect the structures following all flow events with a return interval of 20 years or more as measured at HHD. If the structures fail to meet the stability criteria during the first five years, Tacoma will repair or replace them, modifying the design criteria as necessary in cooperation with NMFS and USFWS. After the first five years, Tacoma will provide funding for one additional replacement of the structures, should they decay, or fail following large floods.

A post-project completion report, describing any deviations from the original design, will be presented to the Services within six months after the project has been completed. The results of the initial stability inspections will be summarized in a report presented at the first five-year review. Additional inspection reports will be submitted at review periods during which a 20-year flow event has occurred.

6.1.4 Compliance Monitoring Measure CMM-04 Tacoma Headworks Upstream Fish Passage Facility Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-04

MEASURE: Tacoma Headworks Upstream Fish Passage Facility Monitoring

Following construction of the new fish ladder and trap and haul facility at the Headworks, the structure will be evaluated to ensure that project design criteria are met. Specific facility design criteria, performance standards, and a detailed evaluation approach will be developed in cooperation with the Services, WDFW, and the MIT during engineering and design of the Headworks modifications associated with the SSP.

Observations of fish behavior at the entrance to the fishway will be used to ensure the passage facility complies with the requirement to facilitate safe upstream passage of adult fish. The presence of adult fish in the vicinity of the Headworks will be evaluated by snorkel surveys conducted every seven days from mid-September to mid-November, and in April and May for the first two years of the project, or until satisfactory results are observed, whichever is longer. Successful capture of adult fish in the trap when adults are holding in the immediate vicinity of the Headworks will indicate that the facility is accessible. Congregations of adult anadromous salmonids below the Headworks, in combination with a low capture rate will indicate that design modifications are required. The results of these surveys will be reported to the Services on an annual basis.

Release records, visual observation of fish condition, and a low rate of mortality will be considered evidence that fish are being successfully transported upstream. These data will be summarized annually and reported to the Services at regularly scheduled five-year reviews.

Tacoma will monitor the effects of fish passage on drinking water quality as part of their surface water treatment operations. If continued monitoring confirms that re-introduction of anadromous fish does not pose a risk to public health, no further action will be taken. If, to adequately protect drinking water quality, it becomes necessary to limit the biomass of adult fish transported into the upper watershed, Tacoma will coordinate with the NMFS, USFWS, and the fisheries managers before instituting measures to decrease fish passage.

Objective

Evaluate the upstream Headworks facility following construction to confirm that it meets project design criteria **and that passage of adult fish does not pose a risk to public health**.

Rationale

Construction of a new fish ladder and trap-and-haul facility at the Headworks is instrumental to the successful restoration of anadromous fish runs into the upper Green River. Evaluation of hydraulic conditions over the expected range of flows following construction is required to demonstrate that the facility complies with design criteria. A post project completion report, describing any deviations from the original design and the results of the hydraulic evaluation, will be presented to the Services within one year after the project has been completed. Adjustments of the fishway may be required if fish do not enter the ladder or fail to ascend into the trap. Monitoring the number, behavior, and physical condition of adult salmonids below the Headworks and in the trap will provide evidence that the project design is appropriate and verify the adequacy of the facility.

Tacoma does not believe re-introduction of anadromous fish to the upper watershed poses a risk to drinking water quality and public health at the numbers, which have been described in the DEIS for the AWS project. This would include the introduction of up to 6,500 adult coho and 2,300 adult chinook. This level would be reached over a period of years allowing adequate opportunities to assess water quality on an ongoing basis. Tacoma will monitor the effects of fish passage on drinking water quality as part of their surface water treatment operations. Measurements will be taken daily at the Headworks and weekly at select locations within the upper watershed. If continued monitoring confirms that re-introduction of anadromous fish does not pose a risk to public health, no further action will be taken. If, to adequately protect drinking water quality, it becomes necessary to limit the biomass of adult fish transported into the upper watershed, Tacoma will coordinate with the NMFS, USFWS, and the fisheries managers before instituting measures to decrease fish passage. As part of the coordination effort, Tacoma will select one or more independent experts to evaluate available options. The independent expert will submit a report to the City, fisheries managers, and public health officials with recommendations as to the level of fish passage that can occur without posing a risk to drinking water quality and public health.

6.1.5 Compliance Monitoring Measure CMM-05 Tacoma Headworks Downstream Fish Bypass Facility Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-05

MEASURE: Tacoma Headworks Downstream Fish Bypass Facility Monitoring

The fish screen and bypass facility will be designed based on specifications for fish protection associated with downstream passage facilities developed by the National Marine Fisheries Service (NMFS) and WDFW, and will meet the maximum design

approach velocity requirement of 0.4 feet per second (fps). The configuration and hydraulic performance of the facility under the normal range of flows expected during the period when juvenile salmonids are migrating downstream will be evaluated following construction to confirm that the facility meets design criteria. Specific design criteria, performance standards, and a detailed evaluation approach will be developed during engineering and design of the Headworks modifications associated with the SSP. A post project completion report describing the results of the performance evaluation will be submitted to the Services within one year of project completion.

Wood debris and drift that collects on the trash racks and fish screens must be periodically removed to maintain satisfactory screen operations. Debris that collects on the fish screens will be removed through mechanical or manual maintenance operations and passed downstream. If wood debris or drift are removed or dislodged via manual methods, the volume will be recorded. The number and approximate size of wood pieces dislodged will be totaled on a monthly basis and reported to the Services as part of an annual review. The volume of wood debris and drift manually removed or dislodged will be summarized and reported to the Services during the first two five years reviews. This monitoring measure will continue through the first ten years following completion of the Headworks SSP modifications.

As part of the SSP Headworks modifications, Tacoma will rebuild its Headworks facility and reconfigure the Green River channel below the Headworks. Headworks modifications will be designed to minimize potential injury to salmonids associated with downstream passage over the Headworks spillway. Within two years following completion of the Headworks modifications, Tacoma will conduct a biological test of the modified spillway to demonstrate that the risk of injury to salmonids passing downstream over the spillway has been minimized.

Objective

Evaluate the screen and bypass facility following construction to confirm that it meets design specifications.

Rationale

Screen bypass facilities like the one that will be constructed at the Headworks are a standard design that has been developed and approved by the NMFS and WDFW. Design specifications for the Headworks bypass facility will be developed based on the NMFS criteria. An evaluation of the hydraulic conditions at the completed project will be made over the range of flows expected during downstream migration following construction. A post project completion report, describing the results of the performance evaluation and any deviations from the original design, will be presented to the Services

within one year after the project has been completed. If the completed facility meets the design specifications, no additional monitoring will be conducted.

Woody debris and organic drift materials are an important link between the aquatic and terrestrial environment (see Subsection 5.2.8). Water withdrawn at Tacoma's Headworks is intentionally screened to prevent the intake of adult and juvenile salmonids and wood debris and organic drift. Past maintenance practices at similar water withdrawal facilities have included the collection and disposal of water-borne debris that collect on trash racks and screens. Disposal of these debris interrupts natural stream processes and presents maintenance cost. Tacoma will ensure that wood debris and drift that collect on trash racks and screens at the Headworks will be passed downstream to continue to be transported to downstream habitats.

Although fish passing downstream over Tacoma's Headworks are believed to incur little injury or mortality during their transit over the existing spillway, some potential for injury does exist. The existing concrete gravity diversion dam is 17 feet high. Reconstruction of the Headworks as part of the SSP will raise the diversion by 6.5 to a total height of 23.5 feet. Although there are no site-specific data on the hydraulic conditions or injury or mortality of fish as the existing Tacoma Headworks diversion dam, information from studies at other projects suggest that the rate of mortality experienced by juvenile fish passing over a 23.5-foot spillway is probably low. Tacoma will rebuild its Headworks facility and reconfigure the channel below the Headworks. Design modifications will consider alternative strategies to minimize potential injury associated with downstream passage of salmonids over the Headworks spillway. Within two years following completion of the Headworks modifications, Tacoma will conduct a biological test of the modified spillway to demonstrate that the risk of injury to juvenile salmonids passing downstream over the spillway has been minimized. Before implementing the study, Tacoma will develop a study design in coordination with the Services. The results of the study will be provided to the Services within six months of completing the field portion of the test.

6.1.6 Compliance Monitoring Measure CMM-06 Monitor the Transport of Juvenile Fish to be Released Upstream of HHD

COMPLIANCE MONITORING MEASURE NUMBER: CMM-06

MEASURE: Monitor the Transport of Juvenile Fish to be Released Upstream of HHD

If the Services and the MIT determine that supplementation of juvenile salmonids upstream of HHD is beneficial, Tacoma will provide funds to record the number, size, and the release site of juvenile fish transported by Tacoma and released above HHD.

Objective

Confirm that juvenile salmonids are successfully released upstream of HHD.

Rationale

A map of the release sites, record of the number and species of fish released at each site, and copies of the completed follow-up survey forms will be provided to the Services annually, and the results of the surveys will be summarized and presented for each five-year review following a period when fish are released.

6.1.7 Compliance Monitoring Measure CMM-07 Side Channel Restoration Signani Slough Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-07

MEASURE: Side Channel Restoration Signani Slough Monitoring

Tacoma will contribute funds to monitor the reconnection of Signani Slough in the middle Green River. The restored channel will be evaluated immediately following construction to document that the site meets the design criteria developed in cooperation with the Services, USACE, WDFW, and MIT. The stability of the structures will be assessed on the basis of: 1) the inlet capacity; 2) alignment, location, extent of fragmentation, or decay of LWD structures; and 3) the condition of anchoring materials. Structures that are deemed non-functional will be modified or replaced by Tacoma as needed within the first five years following construction. Tacoma will also fund one additional complete replacement within the term of the HCP should deterioration of the materials or flood damage make such an action necessary. The physical stability of the structures will be evaluated in years one, three, and five following construction; and after all flows that have a return interval of $\geq$20 years as measured at HHD.

Objective

Assess the physical condition and stability of rehabilitation structures to confirm that they meet design criteria, remain in place, and produce the desired hydraulic conditions.

Rationale

Levees, channel degradation, and controlled flows from HHD have all combined to reduce the Green River's interaction with its former side channel habitats. In 1854, fish could access approximately 1,900 linear miles of stream in the Green River; however, by 1985, only 125 linear miles were still accessible (Fuerstenberg et al. 1996). Off-channel habitat is one obvious source of lost habitat since the turn of the century, and is the focus of the Signani Slough HCM.

The biological benefits of off-channel habitats are well documented (Brown and Hartman 1988; Peterson 1982; Cederholm and Scarlett 1982). For this reason, HCMs that involve reconnection of off-channel habitat and placement of LWD are assumed to be effective provided they remain stable and function as intended. Monitoring for the purposes of this HCP will document that the structures comply with design and performance criteria. However, monitoring of fish use and population surveys may be conducted by Tacoma or other entities as part of the research efforts described in Chapter 6.3. Conceptually, restoration will require breaching the Headworks road in two places and installing two 24- to 48-inch inlet culverts; diverting up to 35 cfs from the mainstem through the side channel; replacing the existing outlet culvert; adding gravels and vegetation; and adding LWD at a frequency of approximately 2 pieces per channel width. Large woody debris placed within Signani Slough will be at least 12 inches in diameter and 20 feet long. Final project design criteria will be developed in cooperation with the Services, USACE, MIT, and state and local agencies prior to construction.

The condition and stability of each structure will be assessed using general criteria developed by Gaboury and Feduk (1996). Large woody debris placed within the side channel will be judged stable if it remains within 16.4 feet (5 meters) of the original location, the alignment has changed less than 20 degrees, anchor cables and connections are intact, and the LWD is sound with little rot, decay or fragmentation. The stability of each enhancement structure will be evaluated through field inspections conducted one, three and five years after construction.

Performance criteria established in the HPA are expected to require that all rehabilitation structures must be able to withstand 100-year peak flows. To this end, Tacoma will also inspect the structures following all flow events with a return interval of 20 years or more

as measured at HHD. If the structures fail to meet the performance and stability criteria during the first five years, Tacoma will repair or replace them, modifying the design criteria as necessary. After the first five years, Tacoma will provide funding for one additional replacement of the structures, should they decay or fail following large floods.

6.1.8 Compliance Monitoring Measure CMM-08 Mainstem Woody Debris Management Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-08

MEASURE: Mainstem Woody Debris Management Monitoring

The amount of LWD collected from the HHD reservoir each year will be recorded, and a LWD accounting spreadsheet will be developed to track the distribution of LWD. The number of pieces of LWD obtained from the reservoir and allocated to 1) the mainstem Green River woody debris management program, 2) other HCP related conservation measures, 3) non-HCP related habitat restoration projects or MIT cultural use within the Green River basin, 4) ecosystem restoration projects outside of the Green River basin, or 5) disposal will be recorded annually. This spreadsheet and documentation of annual communications with other basin stakeholders regarding the availability of LWD for non-HCP related projects will be provided to the Services on request.

Woody debris allocated to unanchored downstream transport will be placed adjacent to the stream within the active channel and allowed to naturally distribute downstream during high flows in the fall. Tacoma will record the initial placement locations, total volume of small woody debris, and the number and size of pieces of LWD placed at each input site. Each input site will be re-visited the following spring to document the number of unanchored pieces of LWD remaining following high flows. ~~A decrease in the number of pieces of LWD at the input sites will be considered evidence that wood has been recruited to downstream reaches.~~

In addition to or instead of unanchored wood placement, LWD may be anchored at specific locations. If LWD is anchored in the river rather than allowing flows to distribute the pieces naturally, the locations and design criteria applied to each placement site will be recorded.

The location and amounts of small woody debris and unanchored LWD placed and successfully recruited each year will be summarized at each five-year review. If anchored placement is implemented, a post-project completion report describing the location and design of LWD anchoring projects will be presented to the Services within six months after each project has been completed, and the results of stability evaluations will be summarized at five-year reviews.

Objective

Document the annual allocation of LWD collected from the reservoir. Confirm that unanchored LWD placement is transported downstream by high flow events by documenting the volume remaining at placement site location(s) the following spring. Confirm that anchored LWD meets design criteria and remains stable at each anchored placement site.

Rational

The goal of the mainstem woody debris management program is to pass at least 50 percent of the wood collected from behind HHD to downstream reaches. The LWD accounting spreadsheet and communications records will confirm that Tacoma is distributing LWD collected from behind HHD to the mainstem LWD management program or other approved uses in compliance with the ITP. Annual site visits will verify whether unanchored LWD is successfully recruited to the river.

If LWD anchoring is determined to be a preferable means of re-introducing LWD to the middle Green River, post-project completion reports will document that anchored LWD placement projects have complied with design criteria developed in cooperation with the Services, USACE, MIT, and state and local agencies. Compliance with the design criteria will be documented by a one-time inspection of each placement site immediately following construction. The condition and stability of each structure will be assessed using general criteria developed by Gaboury and Feduk (1996). Structures will be judged stable if they remain within 16.4 feet (5 meters) of their original location, their alignment has changed less than 20 degrees, anchor materials and connections are intact, and the LWD is sound with little rot, decay or fragmentation. The stability of each rehabilitation structure will be evaluated through field inspections conducted one, three and five years after construction. Performance criteria established in the HPA require that all structures must be able to withstand 100-year peak flows. To this end, Tacoma will also inspect the structures following all flow events with a return interval of 20 years or more as measured at Howard Hanson Dam.

Monitoring the total volume of LWD in the mainstem Green River and evaluating the effectiveness of LWD placement is beyond the scope of this compliance monitoring measure. Research funds are allocated to evaluate the effectiveness of woody debris placement as described in Chapter 6.3.

6.1.9 Compliance Monitoring Measure CMM-09 Mainstem Gravel Nourishment Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-09

MEASURE: Mainstem Gravel Nourishment Monitoring

Tacoma will annually record the volume, type, location, and method of placement of gravel added to the Green River channel below the Headworks. Records will be maintained and made available to the Services on request. Tacoma's commitment under this conservation measure is limited to the contribution of funds necessary to place up to 3,900 yd^3 of gravel appropriately sized for use by spawning salmonids annually. Input sites will be inspected annually following high flows to identify the volume of gravel that has been redistributed downstream within the river channel.

Objective

Document that the required volume of gravel has been input to the Green River.

Rationale

The goal of the gravel nourishment conservation measure is to replace an increment of the bedload that was formerly delivered to the middle Green River but is now trapped behind Howard Hanson Dam. Records documenting the amount and composition of gravel input each year will be maintained to document that Tacoma is complying with the ITP. Monitoring the effectiveness of gravel nourishment is beyond the scope of this compliance monitoring measure. Research funds are allocated to evaluate the effectiveness of gravel nourishment as described in Chapter 6.3.

6.1.10 Compliance Monitoring Measure CMM-10 Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-10

MEASURE: Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Monitoring

Habitat Rehabilitation

Structures installed as part of the Upper Watershed Stream, Wetland and Reservoir Shoreline Rehabilitation HCM will be monitored to ensure that they meet design criteria and remain stable. Final design criteria will be developed in cooperation with the Services, USACE, WDFW, and MIT during the preliminary engineering design

phase of the Additional Water Storage project. The goal of the criterion will be to achieve habitat indices equivalent to "good" ratings applied during Watershed Analysis (WFPB 1997), if applicable to the stream type, or by comparable criteria approved by the Services. The stability of the structures will be assessed using criteria based on the alignment, location, extent of fragmentation or decay, and condition of anchoring materials. The physical stability of the structures will be evaluated in years one, three and five following construction, and thereafter following all flows that have a return interval of 20 years as measured at HHD.

Structures that are deemed non-functional will be modified or replaced by Tacoma as needed within the first five years following construction. Tacoma will also fund one additional complete replacement within the term of the HCP should deterioration of the materials or flood damage make such an action necessary.

Vegetation in the Inundation Pool

Vegetation monitoring will occur through the use of randomly selected permanent transects and/or sample plots to identify vegetation cover and vigor. Vegetation sampling will be conducted in years 1, 3, 5, 7, and 10 following implementation of the AWS Project. If the percent cover does not meet the criteria summarized in Table 6-1 in any given year, Tacoma will re-plant as needed. If the percent cover of invasive non-native species increases over the existing conditions, Tacoma will implement a weed control treatment.

Fish Passage Barriers

The results of the culvert inventory will be presented to the Services within one year of issuance of the ITP, and a prioritized plan to eliminate artificial blockages in the upper HCP Area will be developed in cooperation with the Services, WDFW, MIT, and other landowners with property accessed by the affected roads within two years of issuance of the ITP. Stream crossings modified as part of the culvert improvements HCM will be sized to pass a 100-year flood flow and will meet culvert design criteria specified by the Washington Department of Fish and Wildlife (WDFW 1999) or comparable methodologies approved by the Services. Tacoma will provide documentation of the treatment date, hydrologic analysis, and design criteria used to treat each artificial blockage at the first five-year review. Should the new structures or existing passable structures become impassable during the term of the HCP, Tacoma will replace those structures within one year of identification, modifying the design criteria as necessary to reduce the risk of future blockages. Additional passage barriers treated after the initial reporting period will be summarized at the first five-year review following treatment. Identification of passage barriers that may form following the initial systematic inventory will be accomplished during the post-storm inspection program implemented under the Road Sediment Reduction Plan (RSRP).

Objective

Evaluate the physical condition and stability of rehabilitation structures to confirm that they meet design criteria, remain in place, and produce the desired hydraulic conditions.

Survey planted areas to confirm that the vegetative stocking and cover requirements are met. Confirm that management-related fish passage barriers have been corrected and that new passage structures meet design criteria.

Rationale

Habitat Rehabilitation. Design criteria for the upper watershed stream rehabilitation projects will be developed in cooperation with the Services, USACE, WDFW, and MIT during the PED Phase. Compliance with the design criteria will be documented by a one-time inspection of each rehabilitation site immediately following construction. The condition and stability of each structure will be assessed using general criteria developed by Gaboury and Feduk (1996). Structures will be judged stable if they remain within 16.4 feet (5 meters) of their original location, their alignment has changed less than 20 degrees, anchor materials and connections are intact, and the LWD is sound with little rot, decay or fragmentation. The stability of each rehabilitation structure will be evaluated through field inspections conducted one, three and five years after construction. Performance criteria established in the HPA require that all rehabilitation structures must be able to withstand 100-year peak flows. To this end, Tacoma will also inspect the structures following all flow events with a return interval of 20 years or more as measured at Howard Hanson Dam. If the structures fail to meet the stability criteria during the first five years, Tacoma will repair or replace them, modifying the design criteria as necessary in coordination with the Services. After the first five years, Tacoma will provide funding for one additional replacement of the structures, should they decay or fail following large floods.

A post-project completion report, describing any deviations from the original design, will be presented to the Services within six months after the project has been completed. The results of the initial stability inspections will be summarized in a report presented at the first five-year review. Additional inspection reports will be submitted at review periods during which a 20-year flow event has occurred.

Vegetation in the Inundation Pool. Monitoring of measures designed to establish inundation tolerant vegetation communities within the expanded inundation pool are intended to assess the rate and degree to which the desired plant community develops in newly submerged portions of the inundation pool. The Upper Watershed Rehabilitation HCM will be assumed to have effectively created the desired mix of floodplain forest and wetland communities if vegetation cover meets or exceed the criteria summarized in Table 6-1. If mortality exceeds the allowable percentages, the areas will be replanted after the reason for failure has been identified (e.g., poor planting stock; herbivory; hydrologic conditions). Following the establishment of plant materials, manual control,

or herbicidal treatment for control of non-native invasive species appropriate for the individual species will be developed as necessary.

Fish Passage Barriers. The goal of the culvert improvements HCM is to remove artificial barriers that prevent one or more lifestages of the covered species from moving up or downstream. The initial culvert inventory will be used to prioritize treatment of barriers; inventory results will be provided to the Services within one year and culverts, which require replacement, will be identified and prioritized in coordination with the Services, WDFW, MIT, and other landowners with property accessed by the affected roads within two years. Records of the treatments applied at each site, including the location, date of treatment, results of hydrologic analysis and physical specifications of the new structure (length, diameter, grade etc.) will be provided to the Services on request, and summarized for the first five-year review.

Watershed Analysis stipulates that a RSRP be developed for each watershed administrative unit within two years of final approval by the Department of Natural Resources. The RSRP requires landowners in the upper Green River to develop a program to inspect stream crossing sites with a high risk of failure, blockage or diversion following major storm events. Implementation of this post-storm monitoring will facilitate early identification of stream crossing sites where storm-related impacts that preclude fish passage may have occurred. If a previously passable culvert on Tacoma's land becomes impassable as a result of such impacts, Tacoma will replace the structure within one year of the initial identification. The results of ongoing culvert replacement or repair activities will be summarized for each five-year review.

6.1.11 Compliance Monitoring Measure CMM-11 Snowpack and Precipitation Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-11

MEASURE: Snowpack and Precipitation Monitoring

To document that snowpack and precipitation monitoring stations have been installed and remain operational, Tacoma will ensure that the Services have access to the data on an internet homepage or an equivalent source consistent with advances in data transfer technology. Financial records documenting funds transfer will be provided to the Services on request.

Objective

Document compliance by making snowpack and precipitation monitoring data available to the Services and other interested parties.

Rationale

In order to improve the accuracy of water supply forecasting for the Green River, Tacoma is committing to providing funds for installation and annual maintenance of up to three snow pillows with rain gauges in the upper Green River basin. Snowpack data is downloaded from the snowpack telemetry (SNOTEL) sites by the National Resource Conservation Service on a daily basis between 1 November and 1 July and made available for use in water supply forecasting. Ensuring that snowpack and precipitation monitoring data from the new monitoring sites is available on an internet web page or comparable data transfer technology, and that records of financial contributions to the NRCS are available upon request will document that Tacoma has complied with the requirements of the snowpack monitoring HCM.

6.1.12 Compliance Monitoring Measure CMM-12 Upland Forest Management Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-12

MEASURE: Upland Forest Management Monitoring

In coordination with the Services, Tacoma will place newly acquired forestlands it wishes to add to the HCP area in the upper watershed into one of the three forest management zones prior to initiating any management activities. At each scheduled reporting period, Tacoma will provide the Services with an updated map of the forest management zones and a table of current acreage totals (by zone). The map will show Tacoma ownership in the Upper HCP Area (above the Headworks) and distinguish between the three forest management zones.

A copy of the standard written notification provided to contractors and loggers notifying them of pertinent HCP measures and ensuring that they are aware of all relevant terms and conditions of the HCP will be provided to the Services at the first review in year 2. Updated copies will be provided at subsequent reporting periods if any changes are made to the notification.

At each scheduled reporting period, Tacoma will provide the Services with a current map of the three forest management zones showing the age of all forest stands in the Upper HCP Area and all stands that have been affected by timber harvest activities since the previous reporting period. The map will also depict the locations of sensitive habitats such as moderate to high hazard mass wasting map units (MWMUs), berry

fields, meadows, and ~~unforested talus fields larger than 0.5 acres~~**sites known to be occupied by covered species**.

Tacoma will provide a list of all forest management activities that have occurred in each forest management zone since the previous reporting period. The list will include the location (section, township, range), acreage, site index, type of harvest, active dates of harvest, method(s) of slash disposal and state Forest Practice Application number (if available) for all harvest activities, to document that the criteria summarized in Table 6-1 have been met. The results of any slope stability analysis required by watershed analysis prescriptions will also be included. Tacoma will report the results of post-harvest sampling to verify that leave-tree retention standards have been met. Regular reporting to the agencies will include listings of all hardwood conversion, and salvage timber harvest activities.

A summary list of all reforestation activities will be provided to the agencies at each scheduled review. The list will include the state Forest Practice Application number, date of planting, planting density and species of trees planted for all reforestation activities that have occurred since the previous reporting period.

Objective

Document additions to the Upper HCP Area; verify that forestry activities conducted in each of the three forest management zones comply with management restrictions; and verify snag, green recruitment tree, and log retention requirements have been met in the Upper HCP Area.

Rational

Lands owned by Tacoma in the Upper HCP Area are managed to protect water quality, provide habitat for fish and wildlife, and generate revenues through the harvest of timber to fund the overall land management program and finance the acquisition of additional lands in the watershed (Ryan 1996). The protection of water quality is the primary management objective throughout the watershed, but varying amounts of active management can occur to meet the other two objectives without compromising water quality. The amount of management that can occur in a given area is specified in the Upland Forest Management HCMs. The objective of this compliance monitoring measure is to document that the harvest and reforestation activities conducted in each of the three forest management zones comply with harvest restrictions, verify snag, green recruitment tree, and log retention requirements in the Upper HCP Area are met, and verify that harvest restrictions next to specialized habitats have been implemented.

6.1.13 Compliance Monitoring Measure CMM-13 Riparian Buffer Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-13

MEASURE: Riparian Buffer Monitoring

Maps of riparian buffers will be prepared, and updated every five years. ~~In harvest units where the width of the natural zone adjacent to stream channels is less than 200 feet due to the presence of road or power line corridors,~~ **Riparian buffers will be measured and marked in the field prior to harvest to ensure that they meet criteria summarized in Table 6-1. Marking will be accomplished by measuring the width at least ten increments spaced at 100 feet or less.** Tacoma will ~~measure~~ **monitor** ~~the total width of~~ **each** riparian buffer immediately following harvest to ensure that **buffers have been left as marked.** ~~they meet the criteria summarized in Table 6-1. Surveys will consist of at least ten measurements spaced at increments of 100 feet or less.~~ The results of this monitoring will be provided to the Services at each five-year review.

Objective

Verify compliance with the riparian buffer requirements in the Upper HCP Area.

Rationale

Buffer strips are a common method for maintaining riparian system connection and function in the Northwest. Belt et al. (1992) reviewed over 100 documents that related riparian buffer strips to forest practices, water quality, and fish habitat. The provision of riparian buffer strips was correlated with stream water temperature, cover, large organic debris, and sediment production, all vital ingredients in the life history of salmonids. Johnson and Ryba (1992) found that the riparian zone stabilizes streambanks and prevents erosion, filters suspended sediment, moderates the microclimate, and supports and protects fish species. Riparian buffer areas also provide habitat conditions that are critical to many wildlife species (O'Connell et al. 1993). Thus, compliance with riparian buffer requirements in the Upper HCP Area becomes a critical element of both fish and wildlife management under this HCP.

In most cases, the width of the natural zone adjacent to the channel meets or exceeds minimum riparian buffer requirements. However, in some cases roads or powerline corridors are located within the RMZ, and define the outer limit of the natural zone. In addition, some of the smaller Type 3, 4, and 5 streams are located wholly or partially

within the conservation or commercial zones. On streams where the width of the adjacent natural zone is less than the minimum riparian buffer requirements, no-harvest and partial harvest buffers will extend into the conservation or commercial zone. In harvest units where riparian buffers are located wholly or partially within the commercial or conservation zones, Tacoma will **mark** ~~measure~~ the total width of no-harvest and partial harvest riparian buffers **prior to harvest** to ensure they meet criteria specified in this HCP. At least 10 measurements will be obtained at intervals of ≤100 feet to **delineate** ~~verify~~ the buffer widths. If the buffer zone is more than 1,000 feet long, measurements will be taken every 100 feet for the entire length of the buffer. **Tacoma will re-check buffers in the field following harvest to document that buffers have been left as marked.** ~~These~~ **Riparian monitoring** data will be summarized by stream type, and presented to the Services at each five-year review to document compliance.

6.1.14 Compliance Monitoring Measure CMM-14 Road Construction and Maintenance Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-14

MEASURE: Road Construction and Maintenance Monitoring

Tacoma will document compliance with road management measures by regular reporting of road management activities. Maps depicting the location of all new roads, recently abandoned roads, active roads, and locked gates will be prepared, and updated at each scheduled reporting period. A table will be provided summarizing the characteristics of newly constructed roads including the road length, prism and drainage design, and surfacing. The total length of road abandoned within each reporting period, and a description of actions taken to abandon each road, will also be provided. A map depicting the location of roads relative to MWMUs with a moderate or high mass wasting potential identified during field inspections or through watershed analysis will be updated as necessary and presented at each five-year review. Maps, tables, and the results of any slope stability analyses conducted on new or existing roads as a requirement of watershed analysis will be presented to the Services at each five-year review.

A copy of the RSRP, annual updates (if needed), and results of any evaluation of the success in meeting sediment reduction targets required under watershed analysis prescriptions will be provided to the Services on request and summarized at five-year reviews

Objective

Verify that road management measures have been implemented as specified.

Rationale

Impacts to both fish and wildlife species have been attributed to the construction of roads (WDNR 1997). Roads have been responsible for triggering the majority of management-related landslides in the upper Green River basin (Reynolds 1996; Reynolds and Krogstad in prep). A positive correlation has been observed between the area of logging roads in a basin and levels of fine sediment in downstream spawning gravel (Cederholm et al. 1981). As the level of fine sediment in spawning gravel increases, survival of salmonid eggs and fry declines (Tappel and Bjornn 1983; Reiser and White 1988; Young et al. 1991). Both elk and deer habitat use increases with increasing distance from open roads (WDNR 1997). Thus, Tacoma will monitor roads within the Upper HCP Area to verify that road management measures have been implemented as specified in the HCP.

Periodic evaluation of road surface sediment contributions will be conducted as part of the five-year watershed analysis review process required by the WDNR. Completion of the five-year review is a cooperative effort between upper Green River watershed landowners. Documentation of Tacoma's participation in this process and copies of the RSRP, annual updates and five-year reviews will serve as evidence that Tacoma has complied with road management measures contained in this HCP.

6.1.15 Compliance Monitoring Measure CMM-15 Species-Specific Habitat Management Monitoring

COMPLIANCE MONITORING MEASURE NUMBER: CMM-15

MEASURE: Species-Specific Habitat Management Monitoring

Tacoma employees will receive instruction in the identification of covered species, and employees and contractors will be provided with a data sheet to be completed in the event that a covered species is sighted. Sightings by Tacoma employees or contractors will be reported to the Services and WDFW immediately. Tacoma will also obtain updated information from the WDFW priority habitats database and will provide written documentation that the WDFW and USFWS have been contacted to request information on recent sightings in the vicinity of the HCP area on an annual basis.

At each scheduled reporting period, Tacoma will provide maps depicting the location of newly constructed roads in relation to preferred grizzly bear habitats (berry fields, meadows, avalanche chutes, and wetlands) to verify that no new roads have been constructed through those habitats within the Upper HCP Area. If grizzly bear sightings are confirmed within the Green River watershed, Tacoma will summarize actions taken to comply with management restrictions listed in the species-specific HCMs at the next scheduled reporting period.

If gray wolf den sites are confirmed within the Green River watershed, Tacoma will summarize actions taken to limit activities within specified protection areas surrounding the den and rendezvous sites at each subsequent reporting period until the den site is confirmed to be no longer active. Similar summaries will be provided if Pacific fisher, California wolverine, or Canada lynx den sites are confirmed within the Upper HCP Area.

Seasonal and long-term protection measures will be implemented if peregrine falcon, bald eagle, spotted owl or northern goshawk nest sites are confirmed within the Upper HCP Area. Spotted owls are currently known to be present within the Green River watershed, including one nest site that is located within the Upper HCP Area. Tacoma will maintain records documenting that annual updates on the status of activity centers have been obtained, and will summarize actions taken to limit activity around the nest site at each scheduled five-year review. Similar documentation will be provided to the Services and WDFW if bald eagle, peregrine falcon, or northern goshawk nest sites are confirmed to be present within the Upper HCP Area.

Compliance with protection of trees and snags used by pileated woodpeckers or Vaux's swift will be reported as part of upland forest management monitoring. Compliance with the requirements for limiting ground disturbance and timber harvesting near potential Larch Mountain salamander habitat will also be demonstrated as part of upland forest management monitoring.

Objective

Verify compliance with species-specific management measures.

Rationale

Numerous threatened, endangered, or sensitive species may periodically use the Upper HCP Area. Among these, the following will receive special interest in this HCP: grizzly bear, Pacific fisher, California wolverine, Canada lynx, peregrine falcon, bald eagle, spotted owl, northern goshawk, pileated woodpecker, Vaux's swift, and Larch Mountain salamander. Compliance monitoring will demonstrate that Tacoma has taken steps to identify the status of the covered species in and near the HCP area, and has implemented species-specific HCMs as required.

Many of the conservation measures described in Chapter 5 have been developed to protect or enhance aquatic, wetland, or upland habitats or to address ecosystem functions such as sediment transport. These measures often benefit many of the species for which Tacoma is seeking coverage under the ITP. For example, Upland Forest Management Measures in the upper Green River basin will benefit fish and wildlife, and riparian plant communities. Where a species was not addressed by a specific conservation measure, general habitat conservation measures were considered to provide adequate protection.

Monitoring measures developed for general conservation measures are described elsewhere in this document.

6.2 Effectiveness Monitoring

A brief description of Effectiveness Monitoring Measures (EMMs), monitoring criteria, measurement frequency, reporting requirements, and contingencies are presented in Table 6-2. Tacoma's specific commitments associated with each measure are contained within a series of outlined textboxes that are presented following the table. The supporting rationale for each monitoring measure is also provided following individual textboxes. All monitoring activities will be summarized in writing and presented to the Services during reviews at five-year intervals. Individual monitoring measures may require more frequent reporting. Monitoring data will be maintained by Tacoma, and will be made available to the Services upon request.

The end result of effectiveness monitoring is to facilitate adaptations if the original measure proves inadequate. Detailed effectiveness monitoring criteria will be developed in cooperation with the Services. The results of effectiveness monitoring activities will be reviewed in coordination with the Services at five-year intervals, and if necessary, conservation measures that are judged to be ineffective will be modified. Effectiveness monitoring activities will continue until the Services are satisfied that the measures are achieving the desired resource objective. Funds required to implement effectiveness monitoring will be provided solely by Tacoma. Cost-reductions identified through increased efficiencies, competitive bids, or coordinated efforts with ongoing project operations will accrue to Tacoma.

Table 6-2. Effectiveness Monitoring to be Implemented under Tacoma's Green River HCP.

Measure	Description	Criteria	Measurement frequency	Reporting	Adaptive Management
EMM-01	Snag and Green Recruitment Tree Monitoring	• Rate of snag creation/retention meets the needs of the species covered by the ITP (see Chapter 2)	• Immediately following harvest and at 10-year intervals thereafter	• Data available to the Services on request • Cumulative results reported at 5-year reviews	• After year 10, adjust rate or method of intentional leave-tree mortality in coordination with the Services
EMM-02	Species-Specific Habitat Management Validation	• Document response of covered species to species-specific management measures	• As necessary, if species are present and specific management plans are implemented	• Summarize use of HCP area by covered species at 5-year reviews	• Modify measures as necessary in coordination with the Services
		• Review of response indicates that continuing management activities as prescribed in the species-specific management measure will not prevent continued use of the HCP area by the species	• Annually, as necessary, depending on presence of species	• Annual reporting to the Services until measure is determined to be effective	
EMM-03	**Uneven-Aged Harvest Monitoring and Adaptive Management**	• **Document if windthrow has resulted in individual stands containing an average of less than 25 healthy dominant or co-dominant conifers per acre 5 years after uneven-aged harvesting**	• **Five years after uneven-aged harvest operation**	• **The results of uneven-aged harvest monitoring conducted in the previous year will be reported as part of annual reviews**	• **Adjust the rate and/or method of harvesting**

6.2.1 Effectiveness Monitoring Measure EMM-01 Snag and Green Recruitment Tree Monitoring

MONITORING AND EVALUATION MEASURE: EMM-01

MEASURE: Snag and Green Recruitment Tree Monitoring

At ten-year intervals, Tacoma will revisit harvested areas (and adjacent riparian buffers and Upland Management Areas [UMAs]) to record the number, size, species, condition, and apparent wildlife use of snags and green recruitment trees left in compliance with the Snag and Green Recruitment Tree Habitat Conservation Measure. These data will be used to determine trends in snag retention, recruitment and use. If it is determined through review of Tacoma's data, or through reference to research conducted elsewhere in the Pacific Northwest that the rate at which Tacoma is killing green recruitment trees needs to be adjusted (up or down) to better meet the needs of the covered species, the Services will develop mutually-acceptable adjustments to the specified rate. However, in no case will there be changes to the rate within the first ten years of HCP implementation, as at least that much time is necessary to obtain a sample of sufficient size. The results of this monitoring will be reported at each five-year review.

Objective

Verify success of efforts to retain and recruit snags.

Rationale

Snags are important features of wildlife habitat that are frequently lacking or in short supply in intensively managed commercial forest lands. Given the overall management history of the Upper HCP Area, it is assumed that snag abundance is low. Snags will be allowed to develop through natural processes in the Natural Zone, in stands over 100 years old in the Conservation Zone, and in no-harvest riparian buffers and UMAs. However, in the Commercial Zone, and in stands less than 100 years old in the Conservation Zone, Tacoma may need to actively recruit snags at the time of harvesting by killing a portion of the green recruitment trees, as described in the Upland Forest Management HCMs. Snag creation is a relatively novel management tool, and monitoring is warranted to ensure that the overall objective of providing useable habitat for the covered species is met. Data will therefore be collected from harvested areas ten years after the harvest activities are completed and reviewed by the Services at regularly-scheduled reporting periods. Given the low rate of harvest anticipated under the HCP, a minimum of ten years will be necessary to collect sufficient data for a meaningful analysis. This amount of time will also be necessary to observe any meaningful changes in the number and condition of snags, since snag recruitment and decay are relatively

slow processes. For these reasons, there will be no revisions to the snag recruitment program for at least the first ten years of HCP implementation.

6.2.2 Effectiveness Monitoring Measure EMM-02 Species-Specific Habitat Management Validation

MONITORING AND EVALUATION MEASURE NUMBER: EMM-02

MEASURE: Species-Specific Habitat Management Validation

If the presence of a covered species is confirmed within the HCP area, Tacoma will implement species-specific management measures as described in Chapter 5, and will work with the Services to develop a monitoring program designed to assess the effectiveness of those measures. At each scheduled reporting period, Tacoma will provide available information on the responses of covered species to any of the species-specific management measures that have been implemented during the preceding period (e.g., nest or den site protection buffers or seasonal harvest activity restrictions).

In determining the need to adapt the species-specific conservation measures, it must be recognized that the measures are not intended to completely avoid impacts to covered species, nor are they intended to provide optimal habitat conditions for covered species in the HCP area. If continued management activities conducted in accordance with the prescribed species-specific measures are resulting in few direct impacts to the targeted covered species and do not prevent continued use of the overall HCP area by the species, the measures will not be adjusted. Conversely, if it is determined that continued management activities conducted in accordance with the prescribed measure are preventing use of the HCP area by a covered species, the measure will be adjusted. Adjustments to the species-specific management measures will be developed in coordination with the Services. The results of those adjustments will be evaluated and reported at subsequent five-year reviews until the Services are satisfied with the effectiveness of the conservation measures

Objective

Determine effectiveness of species-specific protection measures.

Rationale

The overall objective of the species-specific management measures in this HCP is to minimize the impacts of Tacoma's activities on various life stages of covered species. To that end, it is appropriate for Tacoma to review the effectiveness of these measures, and make adjustments that may be necessary to accomplish the overall objective. It is equally appropriate, however, to limit adjustments to those necessary to meet the overall

objectives of the HCP, and not necessarily to accommodate changes in public opinion or resource management policy.

6.2.3 Effectiveness Monitoring Measure EMM-03 Uneven-Aged Harvest Monitoring and Adaptive Management

MONITORING AND EVALUATION MEASURE NUMBER: EMM-03

MEASURE: Uneven-Aged Harvest Monitoring and Adaptive Management

Tacoma will evaluate the success of uneven-aged harvesting in the Conservation Zone by revisiting harvested stands five years after each uneven-aged harvest operation. Tacoma will determine the number of standing live overstory trees after five years, the conditions of the standing live trees, the number and size of standing snags, and (if possible) the mechanism responsible for the falling of overstory trees and snags left at the time of uneven-aged harvesting. Tacoma will also make qualitative assessments of understory shrub and forb development five years after harvesting.

If windthrow has resulted in individual stands containing an average of less than 25 healthy dominant or co-dominant conifers per acre five years after uneven-aged harvesting. Tacoma will consider that cause to adjust the rate and/or method of harvesting. Before adjustments are made, however, factors such as aspect, slope, position on slope, soil moisture, and overstory species composition will be evaluated. Adjustments to the rate and/or method of harvesting will only be made in those locations where comparable high rates of windthrow can be expected.

Tacoma and the Services will also keep abreast of research elsewhere in the region on the methods and effects of uneven-aged harvesting, particularly such harvesting with the intention of producing late-seral forest habitat for wildlife. The rate and/or method of uneven-aged harvesting on the Covered Lands will be modified if Tacoma and the Services agree that research suggests the need for a change. Research can suggest a change if it is found that the method and/or rate in the HCP is counter to the objective of accelerating the development of late seral forest conditions and that it is detrimental to the maintenance of habitat for one or more of the Covered Species, or that it conflicts with the protection of individuals of a Covered Species.

Objective

Evaluate the success of uneven-aged harvesting, and adjust the method and/or rate of harvesting, when necessary, to accelerate the development of late-seral coniferous forest conditions.

Rationale

Uneven-aged managed through selection harvest and commercial thinning has been suggested as a means of accelerating the development of late-seral coniferous forest conditions in young managed forests (Carey 1994). Thinning can be problematic; however, because it can lead to increased windthrow among the remaining overstory trees (Stathers et al. 1994), it can retard stand development. Wind is a prevalent problem on the west slopes of the Cascade Mountains, but the effects of wind on overstory trees tend to be somewhat correlated with site-specific conditions (Tang 1995). Most damaging winds come from the south and southwest, making trees on slopes facing those directions most vulnerable. Trees on exposed upper slopes and ridge tops are more vulnerable than trees in protected valley bottoms. Soil moisture can affect susceptibility; wetter soils result in trees with shallower roots that are less stable and more vulnerable to being blown over. The species of tree is also a factor, since some species are characteristically more shallow-rooted than others. Lastly, the history of an individual tree affects its vulnerability to wind. Trees that grow in the open are exposed to wind throughout their lives and develop more extensive root systems to support their larger boles and crowns. Conversely, trees that develop in dense stands typically have narrower stems and less extensive root systems. When these trees are suddenly exposed to increased winds as a result of thinning or selection harvest, they experience increased rates of windthrow.

Tacoma will consider all site-specific conditions when planning commercial thinning operations, and thinning will not occur on sites considered particularly susceptible to windthrow. As an additional precaution, thinned stands will be visited five years after thinning to assess windthrow.

While a certain level of windthrow is natural and desirable for creating late-seral forest conditions, excessive windthrow is not. A threshold of 25 dominant or co-dominant surviving conifers is considered appropriate for the HCP, since stands of this density still have sufficient live trees to develop late-seral forest characteristics (Franklin et al. 1981). An analysis period of five years was chosen because it is believed that if windthrow is going to be excessive, it will appear within the first five years after harvesting. After that time, the combination of increased canopy density (from growth of individual crowns) and increased wind firmness of individual trees (from root and stem development) will decrease the potential for windthrow.

Tacoma and the Services will also review pertinent research in the region on the effects of commercial thinning. If such research suggests the need to change the thinning program in the HCP, Tacoma and the Services will consider such changes. Changes will be made primarily where they will assist in achieving the overall objective for the Conservation Zone (developing and protecting late-seral coniferous forest), but changes may also be considered to accomplish other objectives that do not conflict with the primary objective (e.g., reducing HCP implementation costs).

6.3 Research

The Research Funding Measures (RFMs), measurement frequency, reporting requirements, objectives, and contingencies are summarized in Table 6-3. Tacoma's specific commitments associated with each measure are contained within a series of outlined textboxes that are presented following the table. The supporting rationale for each measure is also provided following individual textboxes. Additional details of the research program will be developed in coordination with the NMFS and USFWS, the USACE and the Green River Flow Management Committee during the preliminary engineering and design phase of the AWS project. The USACE and Tacoma may modify the research program, in coordination with the Green River Flow Management Committee, provided the NMFS and USFWS concur.

Based on the results of the research, Tacoma may modify implementation of the HCP, if requested by the NMFS and USFWS. Tacoma may also modify implementation of the HCP, if requested by the NMFS and USFWS, based on the consensus of the USACE and the Green River Flow Management Committee. Any such modifications made by Tacoma shall not represent additional commitments of money, water, or other resources without the consent of Tacoma. All research activities will be summarized in writing and presented to the Services during reviews at five-year intervals. Individual measures may require more frequent reporting. Research data will be maintained by Tacoma, and will be made available to the Services upon request.

Funding of the research measures is described in Chapter 8 of this HCP. As described in Chapter 8, Tacoma will provide funds solely or in conjunction with other entities. Cost-savings identified through increased efficiencies, competitive bids, or coordinated efforts with other monitoring programs (e.g., King County restoration efforts) will accrue to the Green River research fund. Increased funding of specific research measures must be provided through cost-savings from other RMs or must come from sources other than the City of Tacoma.

Table 6-3. Tacoma's Green River HCP commitments in support of Research.

Measure	Description	Measurement frequency	AWSP Project Years	Reporting	Objective	Contingency
RFM-01 HHD Downstream Fish Passage Research	**A. Monitor movement of juvenile fish into reservoir**					
	Seasonal installation of fyke net in upper mainstem	2 days per week	1-9 years between years 6 and 10	Results will be reviewed annually for minor modifications and reported at the 5-year reviews	Identify species, timing, size and age distribution of fish migrating downstream into Howard Hanson Reservoir	GRFMC to recommend changes to timing and rate of storage/release regime
	B. Monitor reservoir passage of juvenile fish					
	Conduct mobile hydroacoustics surveys of Howard Hanson Reservoir (e.g., USFWS 1993)	Weekly	2, 3, 5, 10	Results will be reviewed annually for minor modifications and reported at the 5-year reviews	Determine fish distribution throughout the reservoir during the peak downstream migration period	GRFMC to recommend changes to timing and rate of storage/release regime
	C. Monitor reservoir passage and survival, fish passage facility survival and fish collection efficiency					
	Paired PIT tag releases and detection	Sample size and replications to be determined during PED phase	1, 2, 5, 10	Results will be reviewed annually for minor modifications and reported at the 5-year reviews	Provide data on reservoir and project passage efficiency and survival	USACE changes to MIS facility, GRFMC to recommend changes to timing and rate of storage/release

Table 6-3. Tacoma's Green River HCP commitments in support of Research.

Measure	Description	Measurement frequency	AWSP Project Years	Reporting	Objective	Contingency
Downstream Fish Passage Research (cont.)	**Seasonal operation of screw trap at the outlet of HHD but upstream of fish bypass outfall**	**Sampling protocol to be determined during PED phase**	**3, 4, 5, 10**	**Results will be reviewed annually and reported at the 5-year reviews**	**Provide data on project passage efficiency and survival**	**GRFMC to recommend changes in MIS operation and changes to timing and rate of storage/release regime**
	D. Monitor condition of fish passing through fish passage facility					
	Sampling station upstream of the outfall will allow assessment of fish condition, and supplemental tagging. Fish assessment will include: • species, number and age; • injury and/or mortality; • length, weight; and • smoltification	Sampling protocol to be determined during PED phase	Annually in years 1-10	Results will be reviewed annually for minor modifications and reported at the 5-year reviews	Provide data on reservoir and project passage efficiency and survival	USACE changes to MIS facility, fisheries agencies to recommend changes to restoration strategy
	E. Marked Fry					
	Mark and recapture juvenile salmonids to quantify capture efficiency of sampling station	Sampling protocol to be determined during PED phase	1,2,3	Results will be reviewed annually for minor modifications and reported at the 5-year reviews	Quantify efficiency of MIS screen and fish bypass facility	USACE changes to MIS facility, GRFMC changes to timing/rate of storage/release

Table 6-3. Tacoma's Green River HCP commitments in support of Research.

Measure	Description	Measurement frequency	AWSP Project Years	Reporting	Objective	Contingency
Downstream Fish Passage Research (cont.)	**F. Hydroacoustic surveys**					
	Fixed hydroacoustics deployed in HHD forebay, fish passage facility horn, and wetwell. Mobile hydroacoustic monitoring and gillnetting in reservoir. Placement of transducers in the passage facility	Sampling protocol to be determined during PED phase	1, 2, 3, 4, 5, 10	Results will be reviewed annually for minor modifications and reported at the 5-year reviews	Determine whether juvenile fish can find and use the bypass system	USACE changes to MIS facility, GRFMC changes to timing and rate of storage/release
	G. Monitor water quality and zooplankton in the reservoir					
	Spring and summer surveys in upper and lower portions of the reservoir	Sampling protocol to be determined during PED phase	1, 5, 10	Results will be reported at the 5-ear reviews	Identify gross changes in reservoir productivity and salmonid feeding habitats that occur as a result of implementing the AWSP	Fisheries agencies to recommend changes to restoration strategy
	H. Monitor Predator Abundance in the Reservoir					
	Snorkel surveys to identify concentrations of predatory fish at migratory transition areas (reservoir confluences, outfalls), hook and line or nets to collect stomach samples	Sampling protocol to be determined during PED phase	3, 5, 10	Results will be reviewed annually for minor modifications and reported at the 5-year reviews	Compare the effects of the AWS on predator populations and consumption rates	Fisheries agencies to recommend predator control program

Table 6-3. Tacoma's Green River HCP commitments in support of Research.

Measure	Description	Measurement frequency	AWSP Project Years	Reporting	Objective	Contingency
RFM-02 Flow Management Research	**A. Monitor effectiveness of flow management strategies on side channel habitats**					
	Physical habitat Quantify inlet/outlet elevations and LWD; map habitat at various flows	Survey every two weeks February-June	1, 4, 10 and every 5 years (11-50)	Results reviewed annually for minor flow changes and reported at first 5-year review	Provide data on side channel connectivity and the quality and quantity of habitat provided by various flow release schedules	GRFMC to recommend changes to timing and rate of storage/release regime
	Biological Conduct snorkel and electrofishing surveys to identify timing of emergence, distribution, growth, and response to flow changes	Survey every two weeks February-June	2, 5, 10 and every 5 years (11-50)	Results reviewed annually for minor flow changes and reported at first 5-year review	Evaluate the biological response to flow management to guide development of a flow management strategy	GRFMC to recommend changes to timing and rate of storage/release regime
	B. Monitor steelhead spawning and incubation Contribute funding to the MIT and WDFW to conduct steelhead spawner surveys	Every 7-10 days April-July	Annually years 1-50	Results reviewed annually for minor flow changes and reported at first 5-year review	Evaluate the effects of the released flows on steelhead spawning and egg incubation	GRFMC to recommend changes to timing and rate of storage/release regime

Table 6-3. Tacoma's Green River HCP commitments in support of Research.

Measure	Description	Measurement frequency	AWSP Project Years	Reporting	Objective	Contingency
Flow Management Research (cont.)	**C. Monitor downstream migration of juvenile salmonids** Install and operate rotary screw trap near RM 34 to monitor mainstem juvenile movement	Four evenings and one 24-hour sample per week from February-June	1, 2, 3, 4, 5, 10 2 years out of every 10 (11-50)	Results will be reviewed annually to suggest minor modifications and reported at the first 5-year review	Identify changes in juvenile salmonid downstream migration patterns resulting from implementation of the AWS project	GRFMC to recommend changes to timing and rate of storage/release regime
	D. Monitor salmon spawning and Incubation (WDFW/MIT) Provide financial support to WDFW/MIT to expand spawning surveys to lateral habitats and restoration sites	Every 10 days September-November	1, 2, 3, 4, 5 and reduced annual effort years 6-50	Results will be reviewed annually to suggest minor modifications and reported at the 5-year review	Identify off channel habitats used by salmonids that are affected by an early refill schedule	GRFMC to recommend changes to timing and rate of storage/release regime
	E. Monitor salmon redds and emergence (MIT/WDFW) Identify salmon redds during spawning season and monitor impacts of early refill using fry emergence traps	Install traps January-February	1, 2, 3,	Results will be reviewed annually to suggest minor modifications and reported at the 5-year review	Evaluate the impact of early refill on salmon emergence and incubation	GRFMC to recommend changes to timing and rate of storage/release regime

Table 6-3. Tacoma's Green River HCP commitments in support of Research.

Measure	Description	Measurement frequency	AWSP Project Years	Reporting	Objective	Contingency
RFM-03 Sediment and Woody Debris Research	**A. Monitor distribution of woody debris** Survey Green River from Headworks to Highway 18 to identify distribution and abundance of woody debris	One survey during early spring to identify woody debris abundance and distribution	1, 2, 3, 4, 5, and 10	Distribution of woody debris to be provided to GRFMC following surveys. Results will be reviewed annually; reported to the Services at year 5 and 10 reviews	Provide data to the NMFS, USFWS, USACE, and the GRFMC that will facilitate an evaluation of the wood debris management program to restore woody debris recruitment and function in the Green River without compromising public health and safety or the viability of downstream flood control measures	Change location and method of placement; within costs of transporting and dumping LWD and five trucks of SWD
	B. Monitor distribution of sediments below Tacoma Headworks • Areal extent of gravel bars exposed at flow < 300 cfs at Auburn gage • Changes in bed elevation and channel capacity at selected cross-sections	One measurement during low flow conditions each year	1, 2, 5, 10	Results will be reviewed after annual surveys to suggest changes in placement method and location; reported to the Services at 5-year reviews	Provide data to NMFS, USFWS, USACE, and the GRFMC that will facilitate an evaluation of gravel nourishment activities in the middle Green River	Change location and method of placement; within costs of 3,900 yd^3 at Flaming Geyser

6.3.1 Research Funding Measure RFM-01 (A-H) HHD Downstream Fish Passage Facility

RESEARCH FUNDING MEASURE NUMBER: RFM-01(A-H)

MEASURE: HHD Downstream Fish Passage Facility

Because of the size and the complexity of the fish passage facility, monitoring and evaluation of the HHD downstream fish passage facility will be segregated into the following categories: fish migration into the reservoir (RFM-01A), reservoir passage of juvenile fish (RFM-01B); reservoir passage survival, fish passage facility survival and fish collection efficiency (RFM-01C); condition of fish passing through collector passage (RFM-01D); marked fry (RFM-01E), hydroacoustic surveys (RFM-01F); reservoir water quality monitoring (RFM-06G), and reservoir predator abundance monitoring (RFM-01H). Data from these studies will be provided to the Green River Flow Management Committee (GRFMC) as needed to make decisions regarding minor annual modifications to the storage and release schedule. The results of the studies will be presented at regularly scheduled five-year reviews to facilitate an evaluation of the effectiveness of the HHD downstream passage facility and to aid in making adaptive management decisions.

RFM-01A: Monitor Movement of Juvenile Fish into Reservoir

Tacoma will contribute funding to operate a fish trap (i.e., fyke net) at the confluence of the North Fork and mainstem Green River to characterize the immigration of juvenile salmonids into the reservoir. This activity will include a weekly evaluation (of two days per week) of immigration timing of juvenile fish entering the reservoir. The species, size, and age of each fish trapped will be recorded. Stomach contents will also be collected from a sub-sample of the fish. In addition to planned weekly evaluations, sampled fish will be marked and evaluated at the outfall sampling station in conjunction with other study components, such as paired PIT-tag release and recapture, assessment of the MIS and fish passage facility efficiency, and hydroacoustic monitoring of the forebay and wetwell. Monitoring will be conducted in project years 1, 2, 3, 4, 5 and every two years between years 6-10. It is recommended that monitoring continue two years out of every 10 years between years 11 and year 50; however, funding for monitoring past year 10 will not be part of Tacoma's obligations under this HCP.

RFM-01B: Monitor Reservoir Passage of Juvenile Fish

Tacoma will contribute funding to PIT-tag (passive-integrated transponder), release, and monitor coho, chinook, and steelhead smolts in project years 2, 3, 5, and 10.

Final numbers of tagged fish of each species will be determined through agency coordination and discussion with a statistician. Tagged fish will be supplied from a mutually agreed-to hatchery/smolt rearing facility or capture process as determined by MIT, WDFW, and NMFS. Two or more release locations will be situated upstream of the fish bypass facility, to include releases at the forebay and 0 to 0.5 miles upstream of the reservoir at various pool levels. Release groups will include simultaneous (at

both release locations), systematic releases of each species, and will be spread out over a three to four week period. Release times will bracket the peak outmigration period for steelhead, coho, and chinook. Tagged fish will be monitored downstream of the modular-inclined screen (MIS) near the bypass outfall. Information gained during reservoir passage monitoring will be provided to the Green River Flow Management Committee annually for use in making minor modifications to reservoir refill strategies. The results of the study will be evaluated and presented at the five-year reviews to determine whether major changes to the storage/release regime are warranted.

RFM-01C: Monitor ~~Reservoir Passage Survival~~, Fish Passage Facility Survival, and Fish Collection Efficiency

Tacoma will contribute funding to monitor the efficiency of the MIS and the fish bypass facility during normal juvenile outmigration times in project years 1 through 10. Three groups of coho salmon, chinook salmon, or steelhead fry will be released to test the efficiency (injury rate and survival) of the MIS screen and fish bypass facility. The final number of replications, and number of marked fish required for each replication, will be determined through agency coordination and discussion with a statistician. Marked fish will come from a mutually agreed-to hatchery/supplementation facility as determined by MIT, WDFW, and NMFS. Three release locations will be used including: upstream of the fish passage facility (either above the trashrack or at the entrance to the facility); below the MIS screen in the bypass flume; and at or below the wetwell exit. One test group will be used to evaluate MIS efficiency; another test group will be used to evaluate the bypass system; and a third test group will be used to evaluate the wetwell exit and bypass flume. Test fish will be recovered at the sampling station located approximately 100 feet upstream of the bypass outfall.

In addition, the bypass and screen are currently proposed to have viewing portals so an observer can look directly at the screen. The MIS surface will be periodically monitored at various flow rates and velocities to assess impingement of smolts against the MIS. Information collected through this monitoring activity will be presented to the USACE to guide development of modifications to the fish passage facility collection system if such actions are deemed necessary by the Services.

Salmonids moving downstream from the upper Green River watershed will pass downstream through the HHD project through either the new intake tower and MIS, or through the existing radial gates. Monitoring the number, species and condition of fish passing through the existing radial will be addressed through operation of a screw trap in the mainstem Green River channel immediately below HHD. A screw trap will be operated during the spring outmigration season below the HHD outlet but upstream of the fish bypass outfall. The results of the screw trap will be used to identify the number, species, and conditions of fish passing through the radial gates during periods of reservoir storage. Operation of the screw trap will also enable researchers to identify project operations that may allow juvenile salmonids to bypass the MIS and counting station and egress through the radial gates. A screw trap will be operated during years 3, 4, 5, and 10 following completion of the AWS project. Results will be reviewed annually and at the five-year reviews.

RFM-01D: Monitor Condition of Fish Passing Through Fish Passage Facility

Tacoma will contribute funding in project years 1 through 10 to monitor the condition (injury, mortality, length, weight, smoltification, and stress) of test and natural outmigrants after the fish pass through the bypass system, are locked through the wetwell, and released through the discharge flume of the HHD fish passage facility. A sampling station will be built near the fish bypass outfall. The sampling station will be used for assessment of marked (fin-clipped and PIT-tagged) and unmarked separate outmigrants. The sampling station will include a separation system that includes PIT-tag monitors, adjustable slide gate, and double read firmware to keep marked from unmarked fish. Sampling station facilities located next to the bypass outfall will include: flume from juvenile bypass to the sampling station; water supply separate from diverted bypass flume; holding tanks or troughs for diverted fish; and a secondary flume to return sampled fish to the Green River.

Marked juveniles and smolts will be analyzed to determine travel time, reservoir survival, and fish passage efficiency at HHD. Unmarked smolts, in conjunction with hydroacoustic monitoring, will be used to determine species composition of outmigrating fish.

Species, growth characteristics, and injury rates will be recorded for each fish. The sampling protocol will consist of a weekly evaluation (two to three hours per day, every other day) during the juvenile salmonid outmigration period. In addition to the planned weekly evaluations of fish condition and species composition, the sampling station will support other study components such as reservoir passage, assessment of the fish passage facility efficiency, and hydroacoustic surveys.

RFM-01E: Marked Fry

Tacoma will contribute funding to test the efficiency of the MIS and fish bypass facility using controlled releases of marked groups of juvenile salmonids. A series of releases of marked chinook, coho, and steelhead juveniles will be conducted during the juvenile salmonid outmigration period. The sample size and number of test releases will be identified during discussions with an experienced biometrician, resource agencies, and the MIT. Tests will be conducted in years 1, 2, and 3.

RFM-01F: Hydroacoustic Surveys

Tacoma will contribute funding to monitor the number and location of juvenile and adult salmonids in the forebay, the number and behavior of fish entering the fish lock, and the diel and seasonal distribution (horizontal and vertical) of juvenile and adult salmonids in the reservoir in years 1 through 5 and year 10. These study elements shall be monitored using hydroacoustic surveys. A scanning system for the tracking of fish in the forebay will include a hydroacoustic system with one or two split-beam transducers. Forebay hydroacoustic monitoring will be used to assess the utility of flow management (i.e., ramp-up and ramp-down events) to attract juvenile fish to the fish passage facility. The information gained from mobile hydroacoustic surveys will be used to evaluate total project survival of juvenile migrants, predator build-up at tributary confluences, and congregations of juvenile outmigrants upstream of the passage facility.

Transducers will also be placed at various locations within the passage facility. Transducers placed downstream of the trashracks will provide entrainment estimates for the fish collector and radial gates. Additional transducers will be placed near the wetwell exit and lock chamber. The facility, as now planned, would have an automatic control that regularly cycles lock events at pre-programmed times. The linked control to the hydroacoustics would be biologically based, giving estimates of fish density in the lock chamber before a lock event occurs.

RFM-01G: Monitor Water Quality and Zooplankton in the Reservoir

Tacoma will contribute funding to establish three permanent water quality stations to monitor the water temperature, DO, and conductivity in Howard Hanson Reservoir. In addition, surveys will be conducted in years 1, 5, and 10 to collect zooplankton data in the upper and lower sections of the reservoir for analysis. This data will be analyzed in conjunction with stomach contents collected during the juvenile salmonid reservoir migration study. Data from the zooplankton surveys will be used to assess changes in the overall composition of the invertebrate community (distribution and densities). Used in combination with other sampling data and mobile-hydroacoustic surveys, water quality surveys will further the knowledge of juvenile salmonid ecology in the reservoir and will be provided to the NMFS, USFWS, WDFW, and MIT in part to assess the influence of water management procedures on prey abundance.

RFM-01H: Monitor Predator Abundance in the Reservoir

Tacoma will contribute funding to monitor the distribution and abundance of trout and other predators of juvenile anadromous salmonids in Howard Hanson Reservoir and in the vicinity of the HHD and Headworks bypass outfalls in order to compare the effects of the AWS project on predator populations and consumption rates. Two years of monitoring of resident trout and/or avian predator abundance in the reservoir will be conducted prior to initial operation of the HHD downstream fish passage facility, followed by post-construction monitoring in project years 3, 5, and 10. It is recommended that additional monitoring be conducted every five years during project years 11-50; however, funding in years 11-50 will not be part of Tacoma's obligations under this HCP. Specific details of the monitoring methodology will be developed during the PED phase, and submitted to the Services for approval prior to implementation. If an increase in overall predator abundance in response to juvenile migratory presence is detected, a selective predator removal program may be initiated. However, such a program would only be initiated if recommended by the NMFS, USFWS, WDFS, and MIT.

Objective

RFM-01A - Identify species, timing, size and age distribution of fish migrating downstream into Howard Hanson Reservoir.

RFM-01B - Determine fish distribution throughout the reservoir during the peak downstream migration period.

RFM-01C - Provide data on reservoir and project passage efficiency and survival.

RFM-01D - Provide data on reservoir and project passage efficiency and survival.

RFM-01E - Quantify efficiency of modular inclined screen (MIS) and fish bypass facility.

RFM-01F - Determine whether juvenile fish can find and use the bypass system.

RFM-01G - Identify gross changes in reservoir productivity and salmonid feeding habitats that occur as a result of implementing the AWS project.

RFM-01H - Compare the effects of the AWS project on predator populations and consumption rates.

Rationale

The use of state-of-the-art fish passage technology and the complexity of the HHD project operations will require an extensive, long-term research program to provide feedback to maximize benefits to outmigrating juvenile salmonids. Such a program is needed to identify optimal facility and reservoir operations that will likely need to be adjusted based on water year type (i.e., wet, normal, or dry), and as the composition of fish stocks changes upstream of HHD. Information gathered as part of this research program will be provided to the GRFMC, agencies responsible for making decisions regarding fisheries management, and to the USACE as necessary to guide adaptive management of the downstream passage facility.

Monitor Movement of Juvenile Fish into Reservoir. Like other HHD downstream fish passage monitoring activities, monitoring the migration of fish into the reservoir is a critical step in evaluating the success of reintroducing anadromous salmonid populations above HHD. Dilley and Wunderlich (1992, 1993) successfully trapped juvenile salmonids in both the North Fork and mainstem of the Green River upstream of the full-pool mark. They determined trends, rather than quantitative estimates of fish movement, that, when compared to hydroacoustics, helped them (or will help others) to understand fish passage through the reservoir. Monitoring fish migration into the reservoir is important to determine if juvenile fish migrations are delayed and if that delay is attributable to the AWS project.

Monitor Reservoir Passage of Juvenile Fish. Beginning in 1991, the USFWS performed a series of studies to evaluate the downstream passage of fish at HHD (Dilley and Wunderlich 1992, 1993; Dilley 1993, 1994; Aitkin et al. 1996). Outmigration study results indicated that increasing outflow from HHD during periods of high inflow will increase the number of smolts that can safely exit the project during the smolt migration period (Dilley and Wunderlich 1992, 1993). In addition to the USFWS studies, in 1984

WDFW trapped smolts at the existing radial gate outlet (Seiler and Neuhauser 1985). The results of these studies were incorporated into the design process and used by the HHD Fish Passage Technical Committee (FPTC) for evaluating alternative designs of HHD outlet facilities (e.g., MIS, fish bypass, and fish lock), and spring refill rule curves.

PIT-tags can be used for the large-scale marking of fry to smolt-sized fish (55-65 mm and larger). Tags can be used to assess reservoir survival, overall fish passage efficiency and timing of entrance into the HHD fish passage facility during refill and high pool (Prentice et al. 1990; Peterson et al. 1994). PIT-tags provide an individual tag number of each marked fish and, when passed through the excitation field of the antennae, provide an immediate return on arrival time of that marked fish at the fish passage facility. PIT-tags can be used to activate fish separation facilities so that marked fish can be automatically diverted to a sampling station. PIT-tags may also be used in combination with coded-wire tags (CWT) during outplants of fry in the upper Green River so that fry-to-smolt survival can be assessed and used for evaluation of overall success of the HHD fish bypass project (Peterson et al. 1994; Achord et al. 1996).

Monitor Reservoir Passage and Survival, Fish Passage Facility Survival, and Fish Collection Efficiency. Although the MIS screen is considered state-of-the-art technology, a test of the MIS installed at the fish passage facility will be necessary to ensure that the MIS screen meets design criteria (Smith 1993; Taft et al. 1993; Winchell et al. 1993; Taft et al. 1997). As with the monitoring measure intended to track movement of juvenile fish through the reservoir, PIT tags are considered the best tool for evaluating passage of fish through the fish passage facility. Passage of juvenile fish through the collector and fish passage facility will be evaluated using the following methodology, or comparable methodologies approved by the Services.

The PIT-tag monitoring system will include:

- One portable PIT-tagging station for tagging fry and/or smolts in the hatchery or field: electronic balance, digitizer, tag detector, automatic tag injector, multi-port controller, laptop, or other portable computer.
- Two or three PIT-tag extended range fish monitors. One monitor will be located at the beginning of the juvenile bypass system while the second will be located near the bypass outfall.

Tagged fish will be monitored by a two- or three-coil system (24 in, 134.2 KHz tunnel monitor with estimated 90-95 percent detection probability, or best available technology) located downstream of the modular-inclined screen (MIS) near the bypass outfall.

A separation system for PIT-tagged fish within the bypass flowline will be installed. Once a fish monitor detects a PIT-tag, a controller will activate a trigger mechanism that opens a slide gate to separate the tagged fish from the juvenile bypass flume, into a secondary flume, and into holding tanks in the sampling station (described below). Components will include an adjustable slide gate and double-read firmware.

Monitor Condition of Fish Passing Through Fish Passage Facility. Monitoring of the condition of fish passing through the fish passage facility is needed to fully evaluate its overall efficacy. Data will be provided to the USACE, NMFS, USFWS, and WDFW for review, and they will recommend changes to the MIS facility or restoration strategy if necessary. This measure will also help determine the composition of fish that exit the facility and ensure that the fish bypass facility meets the desired biological criteria.

Marked Fry. Although laboratory tests and tests at other sites in the Pacific Northwest have shown juvenile salmonid survival rates exceeding 95 percent, the modular inclined screen (MIS) is considered experimental technology, (Smith 1993, Taft et al. 1993, Hilgert et al. 1997). Marked groups of juvenile salmonids will be released to test the efficiency of the MIS and fish bypass facility. Data will be provided to the USACE, NMFS, USFWS, and WDFW for review, and they will recommend changes to the MIS facility or restoration strategy if necessary.

Hydroacoustic Surveys. Hydroacoustic surveys are needed in order to evaluate fish distributions at the dam, forebay, and near the fish passage facility under varying flow and reservoir elevation conditions. Fish densities and trajectories can be quickly mapped over relatively large areas using a combination of target tracking and stepped-scanning hydroacoustic techniques (Thorne 1992). A split-beam transducer on a dual-axis rotator can continuously sample the forebay area and near the intake horn for the presence of downstream-migrating juveniles and larger fish (potential predators). Dilley and Wunderlich (1992, 1993) conducted hydroacoustic monitoring (single beam) of smolt outmigration through the existing bypass and radial gate outlets at HHD. Hydroacoustic monitoring was successfully used in conjunction with scoop-trapping below the outlet to determine the daily passage rates of downstream-migrating coho and chinook salmon juveniles and smolts through the dam. Dilley (1994) was able to characterize the diel and seasonal horizontal and vertical distribution of juvenile and adult anadromous and resident salmonids in the reservoir using mobile hydroacoustic equipment and gill net surveys. Hydroacoustic monitoring is important to determine if juvenile salmonids can find and use the fish bypass entrance.

The proposed monitoring program will include a scanning system for the tracking of fish in the forebay, including a hydroacoustic system with one or two 6 by 10° elliptical split-beam transducers with rotators. Transducers and rotators may be mounted on the trashrack and will require power and data transmission cable connections. System components for the evaluation for outmigrant juvenile anadromous salmonids through HHD include:

- two 6 by 10° split-beam transducers placed downstream of the trashracks;
- one 6° conical transducer with rotator placed in the wetwell exit;
- two 6 by 10° transducers placed in the lock chamber;
- two spare transducers and cable for replacement/back-ups; and
- one mobile hydroacoustic unit to monitor and evaluate outmigrant juvenile anadromous salmonids and larger salmonids at various locations around the facility.

Transducers placed downstream of the trashracks will provide entrainment estimates for the fish collector and radial gates. Additional transducers will be placed near the wetwell exit and lock chamber. The facility, as now planned, would have an automatic control that regularly cycles lock events at pre-programmed times. The linked control to the hydroacoustics would be biologically based, giving estimates of fish density in the lock chamber required before a lock event occurs.

Monitor Water Quality and Zooplankton in the Reservoir. Currently, the USACE conducts semi-monthly water quality surveys within the reservoir, concentrating on temperature, DO, and conductivity at specific depths. This monitoring measure will provide supplemental data on important water quality characteristics at selected locations in the reservoir. The reservoir will be undergoing dynamic changes during the initial years of the AWS project. Changes that may result from the AWS project include: a large influx of nutrients from inundation of surrounding vegetation; an increase in heat budget and development of a more pronounced thermocline; re-introduction of salmon carcasses and resulting increase in nutrients; and increased densities of juvenile salmonids. Any of the aforementioned events may result in changes to the migration pattern of juvenile salmonids moving through HHD. This measure will track any changes in water quality that may affect juvenile salmonid migrations through the reservoir and past HHD. The results of the monitoring will be presented to the NMFS, USFWS, and WDFW at regularly scheduled five-year reviews. These agencies may recommend changes in

reservoir level management if deleterious impacts to migration from water quality parameters are documented.

Monitor Predator Abundance in the Reservoir. Based on the past experience at other Pacific Northwest reservoir systems, there is concern regarding the potential for predation on downstream-migrating juvenile salmonids. Populations of predators (e.g., northern pikeminnow [*Ptychocheilus oregonensis*]) have been listed as a cause of lower survival of juvenile salmonids in many Northwest systems (Cada et al. 1994; Ledgerwood et al. 1994). Rieman et al. (1991) estimated that 14 percent of all juvenile salmonids that enter the John Day Reservoir on the Columbia River are consumed by a combination of northern pikeminnow, walleye (*Stizostedion vitreum*), and/or smallmouth bass (*Micropterus dolomieui*). While existing surveys of the HHD reservoir area do not suggest the likely presence of warmwater gamefish or large populations of northern pikeminnow, large resident trout or residualized salmon may present a predation risk under future project operations. This monitoring measure will track predator populations and indicate if a predator build-up is occurring as a result of the AWS project. If such a build-up does occur, the population of large predatory fish may be cropped to pre-AWS project levels based on recommendations by NMFS and USFWS. If bull trout are observed during any of the surveys, they will not be targeted for removal.

6.3.2 Research Funding Measure RFM-02 (A-E) Flow Management

RESEARCH FUNDING MEASURE NUMBER: RFM-02(A-E)

MEASURE: Flow Management

RFM-02A: Monitor Effect of Flow Management Strategies on Side Channel Habitats

Tacoma will contribute funds for a three-year pre-construction monitoring study to determine the habitat quality, quantity, and juvenile salmonid use of off-channel habitats in the middle Green River, and how that habitat may be enhanced through water management strategies. An initial survey of physical habitat characteristics of side channels in the middle Green River was conducted in the fall of 1996, and an initial survey of juvenile salmonid use conducted in the spring of 1998. Follow-up surveys to document both the physical conditions and biological use of the middle Green River side channels will be conducted prior to initial operation of the HHD downstream fish passage facility.

Following initial operation of the HHD fish passage facility, four years of post-construction monitoring will be conducted. Two years of post-construction monitoring (conducted in project years 1 and 4) will target physical habitat conditions in side

channels. Two additional years of monitoring (in project years 2 and 5) will target observed biological responses to flow management. One additional year of physical habitat monitoring and one additional year of biological monitoring will be funded in each ten-year interval thereafter for the duration of the ITP. Information collected from side channel surveys will be provided to the GRFMC annually to help guide yearly flow release decisions. The results of these studies will be presented to the GRFMC and representatives of agencies responsible for fisheries management to help them determine whether adaptations of the water management strategy on the Green River are required, and to provide valuable information for habitat restoration programs.

RFM-02B: Monitor Steelhead Spawning and Incubation

Tacoma shall provide funding to the MIT and the WDFW to conduct an annual monitoring program aimed at evaluating steelhead spawning and incubation success during the spring and early summer. Surveys will be conducted every seven to ten days in index reaches of the middle Green River extending from just below the Headworks (River Mile [RM] 61.0) to the confluence with Big Soos Creek near Auburn (RM 33.8). The locations of steelhead redds shall be made available to Tacoma and fisheries resource agencies on a real-time basis.

Information collected through the steelhead monitoring surveys will be used, along with an existing flow model, to evaluate the effects of the released flows on steelhead spawning and egg incubation. These data will be used to identify habitats that are affected by refill, and will provide information to the GRFMC that can be used to refine refill operations to minimize the effects of project operations on steelhead embryonic development. Evaluation of water surface elevations necessary to maintain wetted substrates will be used as the basis to refine flows released during refill periods.

RFM-02C: Monitor Downstream Migration of Juvenile Salmonids

Tacoma shall contribute funds to a pre-AWS project monitoring study (i.e., baseline) to document existing characteristics of downstream-migrating juvenile salmonids. Two years of baseline monitoring will be conducted prior to initial operation of the HHD downstream fish passage facility. Annual post-construction monitoring activities shall be conducted in years 1 through 5 of the AWS project and in 2 of every 10 years thereafter for the duration of the ITP. Monitoring within each year will be adjusted for the planned refill strategy, including study of natural and planned freshet releases. This measure will provide information to the GRFMC that can be used to define an adaptive refill and release schedule for the AWS project that will minimize impacts on downstream-migrating juvenile salmonids.

RFM-02D: Monitor Salmon Spawning and Incubation

Tacoma shall provide funding to the MIT and the WDFW to conduct annual surveys to identify the timing of spawning and distribution of salmon redds within the middle Green River during the fall and winter. Salmon redd surveys will be conducted to identify off-channel (e.g., side channels and sloughs) and lateral mainstem habitats that are used by spawning salmonids and may be affected by an early refill schedule. In the event that the data suggest that AWS project operations appear to be conflicting

with salmon incubation conditions, the GRFMC will recommend management adaptations.

RFM-02E: Monitor Salmon Redds and Emergence

Tacoma shall provide funding to the MIT and the WDFW to install fry emergence traps at selected salmon redds identified during the index reach surveys. Traps will be installed in January and February, and visited daily until emergence is complete. Surveys will be conducted annually in years 1, 2 and 3. Results will be reviewed by fisheries agencies annually to suggest minor modifications to the flow regime, and will be synthesized and reported at the first five-year review to provide data that will allow the GRFMC to develop management adaptations to the flow strategy if necessary.

Objective

RFM-02A - Provide data on side channel connectivity and the quality and quantity of habitat provided by various flow release schedules, and evaluate the biological response to flow management to guide development of a flow management strategy.
RFM-02B - Evaluate the effects of the released flows on steelhead spawning and egg incubation.
RFM-02C - Identify changes in juvenile salmonid downstream migration patterns resulting from implementation of the AWS project.
RFM-02D - Identify off channel habitats used by salmonids that are affected by an early refill schedule.
RFM-02E - Evaluate the impact of early refill on salmon emergence and incubation.

Rationale

Monitor Effect of Flow Management Strategies on Side Channel Habitats. In the fall of 1996, Tacoma conducted physical habitat surveys of side channels occurring between the Headworks (RM 61.0) and RM 35.0. A total of 59 side channel areas comprising approximately 15 river miles was identified during the survey. Monitoring side channel habitats under varying flow conditions will be an important tool in guiding future water management strategies, while attempting to increase production of juvenile salmonids in the middle Green River. The proposed methodology for evaluating physical habitat will consist of measuring the stage at side channel inlet and outlet locations, and collecting data on LWD and habitat within each side channel at various flows. A final study plan will be presented to the Services for approval prior to initiating surveys.

Monitor Steelhead Spawning. The majority of the steelhead spawning in the middle Green River occurs from 15 March through 15 June (USACE 1998). Egg incubation continues into July. The WDFW currently monitors steelhead spawning and incubation on the

Green River for fisheries management purposes. A flow model was developed to predict how the proposed project would operate using 1996 reservoir refill rules applied to the historic flow records from 1964 through 1995. The effects of the proposed project on wild winter steelhead spawning and incubation were modeled to quantify how frequently potential steelhead spawning areas would be dewatered under baseline and proposed conditions. The analysis indicated that for the period of record, 1964 through 1995, the most critical time during baseline encompassed the period when steelhead redds are constructed during 1 June through 15 June.

The MIT and WDFW conducts steelhead-spawning surveys in various sections of the Green River. Research monitoring will be conducted to evaluate the effectiveness of flow releases for providing suitable steelhead spawning and incubation conditions in the mainstem. The research results will be reviewed annually at GRFMC meetings and a summary report presented at the first five-year review.

Monitor Downstream Migration of Juvenile Salmonids. Pre-and post-construction monitoring of juvenile salmonid downstream migrations will provide important information regarding migration characteristics and species response to changes in flow management (e.g., early refill, baseline, freshets). In addition, assuming restoration of anadromous salmonids in the upper Green River watershed, such monitoring will provide an index of the success of downstream passage of juveniles, both at HHD and the Headworks. Parameters such as seasonal and diel timing of migration, migrational response to environmental changes (i.e., flow, turbidity, day length, water temperature) by species and by life stage, and observed responses during HHD refill and release will also be evaluated through this monitoring activity. The research results will be reviewed annually at GRFMC meetings and a summary report presented at the first five-year review.

The proposed methodology utilizes a rotary-screw-trap as the primary method of sampling migrating fish (Thedinga et al. 1994). The trap will be located near RM 34 and will be operated from early February through June. Sampling will be conducted during evening hours five days per week with one 24-hour sample randomly selected each week.

Monitor Salmon Spawning and Incubation. Chinook salmon spawning in the Green River starts in late August to early September, while coho and chum salmon usually begin spawning in November (Grette and Salo 1986). The MIT conducts salmon spawning surveys in various sections of the Green River. Research monitoring will be conducted to evaluate the effectiveness of flow releases for maintaining suitable salmon spawning and

incubation conditions in the mainstem. The research results will be reviewed annually at GRFMC meetings and summary report presented at the first five-year review.

Monitor Salmon Redds and Emergence. Chinook salmon spawning in the Green River starts in late August to early September and the eggs and alevins remain within the gravels throughout the winter, emerging February and March. Coho and chum salmon usually begin spawning in November (Grette and Salo 1986), with emergence occurring in the late winter and spring. Chum salmon frequently spawn in side channels that are connected to the river at high flows. Chum salmon generally migrate downstream within a few weeks of emerging from the gravel, and juvenile fish have been known to become trapped in the side channels that become disconnected in the spring (Coccoli 1996). Surveys of salmon emergence will be conducted to evaluate the effectiveness of flow releases for maintaining suitable incubation conditions and side channel connectivity in the mainstem. The research results will be reviewed at GRFMC meetings and a summary report presented at the first five-year review.

6.3.3 Research Funding Measure RFM-03 (A-B) Mainstem Sediment and Woody Debris

RESEARCH FUNDING MEASURE NUMBER: RFM-03 (A-B)

MEASURE: Mainstem Sediment and Woody Debris

RFM-03A: Monitor Distribution of Woody Debris

The LWD management program provides a means of increasing instream LWD throughout the mainstem middle Green River downstream of the Headworks. However, the program must be monitored to ensure that unanchored wood inputs do not detrimentally impact channel stability, public health and safety, or flood control, and that anchored LWD remains stable and functions as intended. Tacoma will fund LWD surveys of the reach between RM 61 and RM 32 in years 1-5 and year 10. **The amount and distribution of LWD between RM 61.5 and RM 32 will be assessed using a modified version of the TFW Level 1 Survey Protocol and Large Woody Debris Jam Methodology.** Additional monitoring at five-year intervals is recommended, but funding for further monitoring will not be part of Tacoma's obligations under this HCP.

If safety or flood control concerns are found to preclude unanchored placement, or if the Services determine continued inputs of unanchored LWD will not effectively contribute to natural stream processes, LWD may be anchored at specific locations. The stability of anchored placements will be conducted as part of compliance monitoring activities described in Chapter 6.1.

A report summarizing data gathered during periodic LWD loading surveys and anchored LWD stability evaluations will be provided to the Services during the five-

year reviews. It is anticipated that the Services, USACE, and the GRFMC will use the monitoring data to adapt the LWD input strategy as needed.

RFM-03B: Monitor Distribution of Sediments below Tacoma Headworks

The amount and composition of sediment stored in the active channel downstream of the input sites will be evaluated by periodic mapping of active in-channel storage sites and surveying cross-sections. Gravel bars will be mapped on low-level aerial photographs taken when flows are less than 300 cfs at the Auburn gage in years 1, 2, 5, and 10 of the HCP. Permanent cross-sections will be installed downstream of the input site near the inlets of major side channels, or in sites where sediment transport calculations suggest that deposition is likely. The cross-sections will be re-surveyed in years 1, 2, 5, and 10 of the HCP. Additional monitoring at five-year intervals is recommended, but funding for monitoring beyond year 10 will not be part of Tacoma's obligations under this HCP.

The results of gravel nourishment monitoring will be reported to the Services following each survey. It is anticipated that the monitoring data will be used by the NMFS, USFWS, USACE, and the GRFMC to refine the placement strategy if needed.

Objective

RFM-03A - Provide data to the NMFS, USFWS, USACE, and the GRFMC that will facilitate an evaluation of the effectiveness of the mainstem LWD management program at restoring LWD recruitment and function in the middle Green River without compromising public health and safety or the viability of downstream flood control measures.

RFM-03B - Provide data to NMFS, USFWS, USACE, and the GRFMC that will facilitate an evaluation of the effectiveness of gravel nourishment activities in the middle Green River at maintaining spawning habitat and side channel connectivity.

Rationale

Monitor Distribution of Woody Debris. Restoring recruitment of wood to the middle Green River requires passing small woody debris, large logs, and rootwads that are trapped behind HHD downstream to the middle Green River. Placing small woody debris and LWD within the active channel at low flows and allowing it to be naturally redistributed by high flows is the most cost-effective means of getting wood back into the system. It is assumed that wood that is deposited within the channel or floodplain during high flows will benefit fish habitat regardless of its final location or configuration.

However, if LWD jams are too frequent or block the entire channel, they may jeopardize or detrimentally impact flood control measures or public health and safety. Monitoring is necessary to make sure that the proposed input process effectively delivers LWD to the

river system and that increased LWD loadings in the middle Green River do not pose unacceptable risks to other beneficial uses of the river.

A survey of LWD loading and distribution in the middle Green River will be conducted after successful LWD recruitment is documented each year for the first five years of the ITP, and in year ten. **The amount and distribution of LWD between the Tacoma Headworks and RM 32 will be assessed using a modified version of the Tacoma Level 1 survey protocol and Large Woody Debris Jams methodology, except that logs wholly in Zone 3 or 4 need not be counted. LWD surveys will be conducted primarily by boat. The minimum size criteria will be modified to reflect a reasonable size for large rivers such as the Green River. A new minimum size criteria will be developed based on a literature review and interviews with practitioners and research scientists currently conducting LWD studies on large rivers. In addition, the minimum piece count of wood required for a wood accumulation to be considered a jam will be modified as appropriate for larger rivers. Debris jams will be further stratified into three categories (small, moderate and large).** ~~Surveys will be conducted using the general approach described in the TFW Ambient Monitoring Level 1 methodology, or a comparable methodology approved by the Services.~~ Information on the LWD loading and distribution will be summarized and presented to the Services at each five-year review. The location of large new LWD jams will be reported to the GRFMC immediately following each survey. If the GRMC concludes that the frequency and size of LWD jams has increased as a result of LWD placement, and that the risk to other beneficial uses has become unacceptable, unrestricted LWD inputs will be halted, and mainstem LWD management will be limited to anchored placement. Alternatively, if the Services determine, based on data presented at the five-year reviews, that continued inputs of unanchored LWD will not effectively contribute to natural stream processes, all or a portion of the LWD allocated to the mainstem LWD management program may be anchored at specific locations within the middle Green mainstem, or redistributed to other approved uses. If the mainstem LWD management program is curtailed at the direction of the Services or GRFMC, funding for this conservation measure will be transferred to other research monitoring measures.

Monitor Distribution of Sediments below Tacoma Headworks. Construction and operation of HHD has blocked the natural downstream transport of gravel-sized sediments in the Green River since 1962. A recent study conducted for the USACE indicated that HHD prevented the delivery of an estimated 6,500 to 19,600 tons (3,900 to 11,800 cubic yards) of coarse bedload per year from the upper Green River basin to depositional reaches in the middle Green River (USACE 1998). The upper watershed previously contributed

more than 90 percent of the alluvial materials deposited by the middle Green River (Mullineaux 1970). Thus, the decreased sediment inputs are believed to have reduced the amount of available spawning gravels downstream of HHD, and could result in disconnection of side channel habitats as the mainstem incises to form an armor layer. Tacoma has agreed to help fund and monitor gravel nourishment activities for years 1-10 as part of the AWS project.

The results of gravel nourishment monitoring will be reported to the GRFMC prior to subsequent gravel placement following each re-survey. Monitoring data will facilitate adaptation of the placement strategy if gravels are not mobilized as efficiently as anticipated, or if alternate placement locations are deemed to be more beneficial biologically. The decision to change the gravel nourishment strategy will be made by the GRFMC with the approval of the NMFS and USFWS.

Initiating gravel placement activities using the most conservative estimate of pre-HHD bedload transport (i.e., 3,900 yd^3/year), and monitoring active storage and channel capacity downstream of the placement site will ensure that aggradation that could compromise flood control measures is identified in a timely manner. If the NMFS, USFWS, USACE, and the GRFMC conclude that continued gravel placement would compromise downstream flood control measures, gravel nourishment will be reduced or halted, and the funds for gravel nourishment monitoring will be redirected to other research monitoring efforts. Conversely, monitoring may also indicate that increasing the amount of gravel input annually would be beneficial. Tacoma will not be obligated to provide additional funding for increased gravel nourishment as a part of this HCP, but funding could be obtained from alternative sources and implemented under the Green River Flow Management Committee's adaptive management program.

Literature Cited

References cited in this chapter are provided in Chapter 10 of the HCP. Chapters 5, 6, and 8 of the HCP contain the primary commitments of Tacoma in support of its application for an ITP. The Underline and Strikeout versions of HCP Chapters 5, 6, and 8 are included in the FEIS to identify changes in the Draft HCP that were made in response to public comments and additional analyses conducted by the Services. A final HCP, including an updated list of references cited in each chapter, will be issued when the Services have reached a decision regarding issuance of an ITP.

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8. Costs and Funding of the Conservation, Monitoring, and Research Measures

8.1 Estimated Costs of the Habitat Conservation Measures

The City of Tacoma's (Tacoma) Green River Habitat Conservation Plan (HCP) brings together the results of over 20 years of research, evaluation, discussions, negotiation and legal proceedings regarding Tacoma's water supply operations and watershed management and protection in the Green River basin. As a result of those efforts a variety of permits, agreements, and memorandas of understanding have been developed to gain approval for the continued use of Tacoma's First Diversion Water Right claim and exercise its Second Diversion Water Right. As a result of such discussions, Tacoma has taken an active part in identifying impacts related to its operations and activities, and developing measures to avoid, minimize, or otherwise mitigate such impacts. Over the years, Tacoma entered into agreements to constrain its water withdrawals to protect fish and wildlife resources and to provide a variety of mitigation measures totaling millions of dollars.

In view of the recent listing of Pacific Northwest species such as the chinook salmon, and the potential for future listings under the Endangered Species Act (ESA), Tacoma re-evaluated its water supply and watershed protection activities. Tacoma prepared this HCP to support its application for an Incidental Take Permit (ITP) in order to gain certainty over its ability to meet the current and future water demands of its customers. In many cases, water supply restrictions and mitigation efforts developed through other proceedings served to satisfy requirements of the ESA. In other cases, new habitat conservation measures were developed to ensure that Tacoma's activities are in compliance with the ESA.

The habitat conservation measures identified in Chapter 5 represent Tacoma's best efforts to avoid, minimize, or otherwise mitigate impacts associated with water supply and watershed protection activities. The total estimated cost of the habitat conservation measures, including measures developed as part of prior agreements and conservation measures developed specifically as part of this HCP, total approximately $57,000,000 (Table 8-1). The majority of the costs of the habitat conservation measures represent commitments made by Tacoma as part of agreements reached for the Second Supply Project, the 1995 Muckleshoot Indian Tribe/Tacoma Public Utilities (MIT/TPU) Settlement Agreement and as local sponsor for the U.S. Army Corps of Engineers' (USACE)

Table 8-1. Estimated Costs of Habitat Conservation Measures identified in Tacoma's Green River Habitat Conservation Plan (cost in 1997 dollars x $1,000 for 50 year term of the Incidental Take Permit)

Measure	Description	Joint (Tacoma/USACE/other) Funding Estimate [1]	Tacoma Only Funding Estimate	Total
HCM 1-01	Minimum Instream Flows	$0	100%	[2]
HCM 1-02	Seasonal Restrictions on SDWR	$0	100%	[2]
HCM 1-03	Tacoma Headworks Upstream Fish Passage Facility	$0	$2,530	$2,530
HCM 1-04	Tacoma Headworks Downstream Fish Bypass Facility	$0	$3,060	$3,060
HCM 1-05	Tacoma Headworks Large Woody Debris (LWD)/Rootwad Placement	$0	10	10
HCM 2-01	HHD Downstream Fish Passage Facility	$34,000	$0	$34,000
HCM 2-02	HHD Non-Dedicated Storage and Flow Management Strategy	$125	$0	$125
HCM 2-03	Upper Watershed Stream, Wetland, and Reservoir Shoreline Rehabilitation Measures	$1,099	$0	$1,099
HCM 2-04	Standing Timber Retention	$0	$1,090[5]	$1,090
HCM 2-05	Juvenile Salmonid Transport and Release [3]	$0	$287	$287
HCM 2-06	Low Flow Augmentation [4]	$0	$400	$400
HCM 2-07	Side Channel Re-connection Signani Slough	$947	$0	$947
HCM 2-08	Woody Debris Management Program	$500	$500[5]	$1,000
HCM 2-09	Mainstem Gravel Nourishment	$4,700	$0	$4,700
HCM 2-10	Headwater Stream Rehabilitation	$341	$0	$341
HCM 2-11	Snowpack and Precipitation Monitoring	$71	$0	$71
HCM 3-01	Upland Forest Management Measures	$0	$2,129[5]	$2,129
HCM 3-02	Riparian Management Measures	$0	$3,000[5]	$3,000
HCM 3-03	Road Construction and Maintenance Measures	$0	$1,714	$1,714
HCM 3-04	Species-specific Management Measures	$0	$741	$741
TOTAL ESTIMATED COST		**$41,783**	**$15,461**	**$57,244**

1 The Joint Funding estimate represents a cost-share arrangement between Tacoma, the USACE, and other potential partners. The cost-share percentages are subject to change in the Water Resource Development Act, other Congressional initiatives, or USACE Section 7 requirements under the Endangered Species Act. **Tacoma's share of the Joint Funding commitment has not been determined, but is expected to range between 20 and 50 percent. The Tacoma Only funding estimate refers to those measures that will be funded solely by Tacoma and are in addition to Tacoma's share of the Joint Funding commitment.**

2 Costs associated with this measure are opportunity costs that will only occur in extreme drought years. Prior guarantee of funding is not necessary to ensure compliance with the conditions of the HCP.

3 Estimated capital expenditure, no operational costs included.

4 Tacoma expenditure, USACE costs not included.

5 ~~Lost revenue included in funding estimates~~ **The value of lost revenue is included in funding estimates. The cost associated with HCM 2-04 is the foregone value associated with leaving merchantable timber standing in the new inundation zone (elevation 1,141 ft to 1,167 ft) of Howard Hanson Reservoir. The cost of HCM 2-08 includes the foregone value resulting from using the wood debris collected in the reservoir for habitat restoration purposes rather than selling it. The costs of HCM 3-01 include opportunity costs associated with leaving merchantable timber standing in reserves; opportunity costs of extending rotations outside reserves; and management costs associated with delineating, working around, and monitoring special management areas. The estimated costs for HCM 3-02 are primarily the foregone value resulting from leaving merchantable timber in riparian buffers and include the value associated with foregoing timber harvest to comply with both the Washington Forest Practice Rules and HCM 3-02. The HCP requirements are considerably greater than current state Forest Practices Rules, and they will result in the retention of a least double the timber volume.**

Additional Water Storage project at Howard Hanson Dam (HHD). Much of these costs represent cost-share arrangements between Tacoma and the USACE or other entities.~~; however, approximately 27 percent of these costs are funded by Tacoma.~~

The costs of this HCP represent Tacoma's commitment to manage its water supply in a manner that addresses the needs of the people of South Puget Sound along with the needs of the fish and wildlife in the Green River basin. In some cases, such as restrictions on the use of the First Diversion Water Right claim (HCM 1-01) and additional constraints on the exercise of the Second Diversion Water Right (HCM 1-02), the value to Tacoma of the lost opportunity for additional water supply was not included as a cost under the HCP (see Table 8-1). These costs would only be realized as reduced revenues in extreme drought years, and not as capital expenditures that would require a guarantee in order to ensure successful implementation of the HCP.

As co-sponsors of the Additional Water Storage (AWS) project at HHD, Tacoma and the USACE have agreed to cost-share many funding requirements outlined in this Habitat Conservation Plan. The final cost-share agreement will be subject to negotiations. The USACE must first define its obligations in consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the ESA. ~~The USACE will then need to secure the necessary appropriations from Congress to meet its obligations.~~ Tacoma will define its financial obligations in this HCP as provided for under Section 10 of the ESA. A final resolution of the exact cost-share arrangement will depend on the outcome of the USACE negotiations.~~ The AWS project, and associated incidental take of listed species, will not occur until funding obligations are finalized.~~

8.2 Estimated Costs of the Monitoring and Research Program

As described in Chapter 6, Tacoma will implement a monitoring and research program consisting of three main types of measures: compliance monitoring to ensure conservation measures are implemented according to specified standards; effectiveness monitoring to provide feedback to improve the performance and functionality of measures where Tacoma is responsible for ensuring results; and funding of a research program designed to provide resource agencies and the MIT with information needed to adaptively manage the natural resources of the Green River on a real-time basis.

8.2.1 Compliance Monitoring

Funds required to implement compliance monitoring will be provided by Tacoma alone or in conjunction with other agencies. In most cases, compliance monitoring consists of verification that the conservation measures have been funded or implemented. Project completion reports or annual summaries of activities conducted specific to each measure will be prepared and submitted as described in Chapter 5. Tacoma has estimated that costs to conduct compliance monitoring over the 50-year term of the Incidental Take Permit will not exceed $**600,000**~~500,000~~. This amount represents potential cost-share arrangements between Tacoma and the USACE or other agencies. The cost-share percentages are subject to change. Cost-reductions identified through increased efficiencies, competitive bids, or coordinated efforts with ongoing project operations will accrue to Tacoma or other funding agencies.

8.2.2 Effectiveness Monitoring

Funds required to implement effectiveness monitoring will be provided by Tacoma. Changes to habitat conservation measures HCM 3-01G (Snags, Green Recruitment Trees and Logs) and HCM 3-04 (Species-specific Management Measures) as a result of monitoring efforts may reduce Tacoma's income from timber harvest in the upper watershed. It is difficult to predict the extent of such adaptations to the conservation measures; however, any change will be primarily reflected in changes in Tacoma's revenue from timber harvest in the upper watershed. Revenue from timber sales on Tacoma lands in the Green River watershed is used for additional land acquisition and forest management and water quality enhancement projects in the upper watershed. Reductions in revenue will reduce the rate of land acquisition, but will not represent additional cash outlays on the part of Tacoma or interfere with effective implementation of the HCP.

8.2.3 Research Monitoring

Funds required for the research monitoring program will be provided by Tacoma, alone or in conjunction with other agencies. Annual funding of the research efforts will begin immediately following construction of the Additional Water Storage project at HHD. The intent of the research fund is to allow the USACE to coordinate with the Green River Flow Management Committee to assist in the design of an annual Green River research program, subject to approval of the NMFS and the USFWS. Details of the research program are identified in Chapter 6 of this HCP. The program addresses three primary areas of uncertainty associated with rehabilitation of natural resources of the Green River:

1) downstream fish passage at HHD (including reservoir and dam passage);
2) flow management in the middle and lower Green River; and
3) sediment and woody debris transport.

Contributions to the research fund during the first ten years of the AWS project represents a cost-share arrangement between Tacoma and the USACE or other agencies. The cost-share percentages are subject to changes in the Water Resource Development Act, other Congressional funding initiatives, or USACE requirements under Section 7 of the ESA. During the first ten years of the research program, Tacoma will share the funding commitment associated with downstream fish passage, flow management and sediment and woody debris transport measures. Total expenditures under the research program cannot exceed the sum of all individual measures.

A total of $3,432,000 has been allocated to the research fund during the first ten years of the research program (Table 8-2). This sum does not include $100,000 paid directly to the MIT and the Washington State Department of Fish and Wildlife to conduct annual steelhead spawning surveys as per the 1995 MIT/TPU Agreement. The $3,432,000 joint USACE/Tacoma cost-share, and the $100,000 to be paid directly by Tacoma to the MIT and WDFW combine to total the $3,532,000 allocated to fund research and adaptive management within the first ten years of the program (Table 8-2).

The funding stream represents a firm commitment that will not be reduced due to increased efficiencies, coordination of research efforts or contributions by other agencies. However, Tacoma recognizes that changes in the allocation of funds among different elements of the research fund may be desirable during implementation. To retain the integrity of the HCP but also allow flexibility, funds can be transferred between measures subject to approval of the USACE, the NMFS, and the USFWS. Such changes will be made subject to the cost cap of $3,432,000 during the first ten years of the research program.

During years 11 through 50 of the research program, Tacoma will provide complete funding for flow management measures identified in Table 8-2. During this period, funds can be transferred between flow management measures within specific years, or funds for a current year can be retained and carried forward to supplement future expenditures. Funds allocated for future flow management research efforts cannot be advanced to

Table 8-2. Estimated costs for research and adaptive management associated with Tacoma's Green River Habitat Conservation Plan.

Research Measure	Research Issue	Description of Research Activity	Cost (in thousands of dollars)															Total Cost Yrs 1-50
			1	2	3	4	5	6-10[1]	Subtotal Yrs 1-10	11-15[1]	16-20[1]	21-25[1]	26-30[1]	31-35[1]	36-40[1]	41-45[1]	46-50[1]	
Downstream Fish Passage	Reservoir Passage of Juvenile Fish	Fyke nets	35	35	35	35	35	70	245									**245**
Downstream Fish Passage	Reservoir Passage of Juvenile Fish	Hydroacoustics (mobile)		50	50		50	50	200									**200**
Downstream Fish Passage	Reservoir Passage of Juvenile Fish	Paired PIT-tag releases	120	120			120	120	48			Funding for the monitoring of						**480**
Downstream Fish Passage	Reservoir Passage of Juvenile Fish	Screw trap at HHD outlet			94	94	94	94	376			downstream fish passage in						**376**
Downstream Fish Passage	Fish Collector Passage	Sampling station	30	30	30	30	30	150	300			years 11 through 50 will not be part						**300**
Downstream Fish Passage	Fish Passage Facility	Marked fry	20	20	20				60			of Tacoma's obligations under						**60**
Downstream Fish Passage	Fish Passage Facility	Hydroacoustics (forebay/wetwell)	70	70	70	70	70	70	420			Section 10 of the ESA.						**420**
Downstream Fish Passage	Reservoir Passage of Juvenile Fish	Zooplankton abundance/water quality	30				30	30	90									**90**
Downstream Fish Passage	Reservoir Passage of Juvenile Fish	Predator abundance			45		45	25	115									**115**
SUBTOTAL			**305**	**325**	**344**	**229**	**474**	**609**	**2,286**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2,286**
Flow Management	Side-channel Connectivity	Side-channel (physical)	35			35		35	105	35	35	35	35	35	35	35	35	**385**
Flow Management	Side-channel Connectivity	Side-channel (biological)		38			38	38	114	38	38	38	38	38	38	38	38	**418**
Flow Management	Steelhead Spawning[2]	Redd surveys	10	10	10	10	10	50	100	50	50	50	50	50	50	50	50	**500**
Flow Management	Juvenile Instream Migration	Screw trap (RM 34)[3]	94	94	94	94	94	94	564		188		188		188		188	**1,316**
Flow Management	Spawning Surveys Above and Below HHD	Salmon spawning surveys	15	15	15	15	15	50	125	50	50	50	50	50	50	50	50	**525**
Flow Management	Incubation	Redd monitor/emergence traps	30	30	30				90									**90**
SUBTOTAL[2]			**184**	**187**	**149**	**154**	**157**	**267**	**1,098**	**173**	**361**	**173**	**361**	**173**	**361**	**173**	**361**	**3,234**
Sediment/Wood Transport	Mainstem Woody Debris Survey	Survey mainstem river (RM 61.5-RM33)	8	8	8	8	8	8	48	Funding for the monitoring of sediment/wood transport in years 11 through 50 will not be part of Tacoma's obligation under Section 10 of the ESA.								**48**
Sediment/Wood Transport	Gravel Nourishment	Monitor gravel placement	25	25			25	25	100									**100**
SUBTOTAL			**33**	**33**	**8**	**8**	**33**	**33**	**148**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**148**
TOTAL HCP / AWSP[2]			**522**	**545**	**501**	**391**	**664**	**909**	**3,532**	**173**	**361**	**173**	**361**	**173**	**361**	**173**	**361**	**5,668**

1 Cost represents cumulative total for monitoring conducted over the five-year period.
For example, steelhead redd surveys, at $10,000 per year will be conducted annually for a cumulative total of $50,000 every five years.

2 Cost to support steelhead spawning surveys will be paid directly to the MIT and the Washington State Department of Fish and Wildlife and will not be co-mingled with the Research Fund.

3 Screw traps will be deployed an average of two consecutive years every ten years during years 6-50.

supplement ongoing research efforts. Such changes will be made subject to the flow management research program cost cap of $1,736,000. This amount does not include funds paid directly to the MIT and the Washington State Department of Fish and Wildlife to conduct annual steelhead spawning surveys as per the 1995 MIT/TPU Agreement. Tacoma will not provide funding support for downstream fish passage and sediment and woody debris transport measures during years 11 through 50 of the research program. Funding support for these measures during years 11 through 50 of the research program must be provided by other entities.

8.3 TOTAL ESTIMATED COSTS OF THE HABITAT CONSERVATION PLAN

Total costs for the Green River HCP are approximately $**63,512,000** ~~63,412,000~~ (Table 8-3). Approximately $17,697,000 of those costs, or about 28 percent, represents a funding commitment of Tacoma. The other 72 percent of those costs represent cost-share arrangements between Tacoma and other entities. Tacoma will fund its commitments made in the HCP, subject to the overall research cost cap established for the HCP. Funding will be from sources at Tacoma's discretion, including, but not limited to revenues from the sale of water, timber and land, and from outside sources such as grants or contributions. All cost estimates and commitments in the HCP are given in 1997 dollars.

Table 8-3. Summary of Tacoma's Funding of the Green River HCP (cost in 1997 dollars x 1,000 for 50-year term of the Incidental Take Permit).

Activity	Joint USACE/ Tacoma Funding	Tacoma Funding	Total
HCM Cost Estimate	$41,783	$15,461	$57,244
Compliance Monitoring Cost Estimate [1]	$600	$0	$600
Effectiveness Monitoring Cost Estimate	$0	[2]	[2]
Research Funding Commitment [3]			
Downstream Fish Passage	$2,286	$0	$2,286
Flow Management	$998	$1,736	$2,734
Sediment / Wood Transport	$148	$0	$148
MIT/WDFW Research Funding	$0	$500	$500
Total	$45,815	$17,697	$63,512

[1] Tacoma's contribution to compliance monitoring includes potential cost-share arrangements between Tacoma and the U.S. Army Corps of Engineers or other agencies. The cost-share percentages are subject to change. Cost-reductions identified through increased efficiencies, competitive bids or coordinated efforts with ongoing project operations will accrue to Tacoma or other funding agencies.

[2] Costs associated with these measures are opportunity costs that will occur only if it is necessary for Tacoma water to increase green-tree retention and reduce overall timber harvest revenues in the upper Green River watersheds. Such reductions in timber revenues will not interfere with the implementation of the HCP.

[3] Tacoma's contribution to research funding during years 1-10 of the Additional Water Storage Project represents a cost-share arrangement between Tacoma and the USACE or other agencies. The cost-share percentages are subject to changes in the Water Resource Development Act, other Congressional initiatives, or USACE requirements under Section 7 of the Endangered Species Act. The funding stream represents a firm commitment that will not be reduced due to increased efficiencies, coordination of research efforts or contributions by other agencies.

HCM Habitat Conservation Measure
MIT Muckleshoot Indian Tribe
WDFW Washington State Department of Fish and Wildlife
USACE U.S. Army Corps of Engineers

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