

**Wenatchee Mountains Checker-mallow**  
*(Sidalcea oregana var. calva)*

**5-Year Review**  
**Summary and Evaluation**



Wenatchee Mountains checker-mallow (*Sidalcea oregana* var. *calva*)  
Photo by Ted Thompson/DFCS

**September 30, 2011**

**U.S. Fish and Wildlife Service**  
**Washington Fish and Wildlife Office**  
**Lacey, Washington 98503**

**5-YEAR REVIEW**  
**Species reviewed: Wenatchee Mountains Checker-mallow**  
**(*Sidalcea oregana* var. *calva*)**

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## **5-YEAR REVIEW**

### **Wenatchee Mountains Checker-mallow (*Sidalcea oregana* var. *calva*)**

#### **1.0 GENERAL INFORMATION**

##### **1.1 Reviewers**

**Lead Regional Office:** Sarah Hall, Region 1, Regional Office, Portland, Oregon, 503/231-6868

**Lead Field Office:** Tim McCracken, Central Washington Field Office, Wenatchee, Washington, 509/665-3508 x17

**Cooperating Field Office(s):** Jodi Bush, Ted Thomas, Washington Fish and Wildlife Office, Lacey, Washington, 360/753-4327

**1.2 Methodology used to complete the review:** New information was gathered and reviewed, and draft documents were developed by staff at the U.S. Fish and Wildlife Service's (Service) Central Washington Field Office.

This 5-year review is the joint effort of the *Sidalcea oregana* var. *calva* Technical Team (Technical Team). Participating members include:

- Joseph Arnett, Botanist, Washington Natural Heritage Program, Washington Department of Natural Resources;
- Wendy Gibble, Botanist and Program Manager, University of Washington Center for Rare Plant Care and Conservation [Rare Care];
- Lauri Malmquist, Botanist, Wenatchee National Forest, Leavenworth Ranger District;
- Tim McCracken, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Central Washington Field Office;
- Dr. Sarah Reichard, Professor, University of Washington, Center for Urban Horticulture, College of Forest Resources; and,
- David Wilderman, Natural Area Ecologist, Washington Department of Natural Resources (WDNR).

The participation of the Technical Team is supported by the agency or organizations where they are employed. Participation of the Washington Natural Heritage Program is partially supported by a cooperative agreement under section 6 of the Endangered Species Act (ESA) between the WDNR and the Service. The findings of this review are based on research and monitoring of the known occurrences of the species that have been conducted since development of the 2004 Recovery Plan (USFWS 2004). Population data, new information, and results of research on *Sidalcea oregana* var. *calva* subsequent to the Recovery Plan are summarized below in the Synthesis section (2.4). The new information that forms the basis of this review is a combination of peer reviewed published literature; agency reports, monitoring data, meeting presentations, handout materials, and related notes of the *Sidalcea oregana* var. *calva* Technical Team.

### 1.3 Background:

**1.3.1 FR Notice citation announcing initiation of this review:** November 24, 2010. Endangered and Threatened Wildlife and Plants; 5-Year Status Reviews of 58 Species in Oregon, Washington, California and Hawaii. 75 FR 71726

#### 1.3.2 Listing history

Original Listing

**FR notice:** 64 FR 71680

**Date listed:** December 22, 1999

**Entity listed:** Variety

**Classification:** Endangered

**Revised Listing, if applicable:** N/A

**1.3.3 Associated rulemakings:** 2001. Final Designation of Critical Habitat for *Sidalcea oregana* var. *calva* (Wenatchee Mountains Checker-Mallow) 66 FR 46536.

**1.3.4 Review History:** None

**1.3.5 Species' Recovery Priority Number at start of this 5-year review:** 3 on a scale of 1 to 18, reflecting a high degree of threat, a high potential for recovery, and the plant's taxonomic status as a variety.

#### 1.3.6 Current Recovery Plan or Outline

**Name of plan or outline:** Recovery Plan for *Sidalcea oregana* var. *calva* (Wenatchee Mountains Checker-Mallow) (USFWS 2004). 69 FR 58944.

**Date issued:** October 1, 2004

**Dates of previous revisions, if applicable:** Draft Recovery Plan, 68 FR 59414, published October 15, 2003.

## 2.0 REVIEW ANALYSIS

### 2.1 Application of the 1996 Distinct Population Segment (DPS) policy

#### 2.1.1 Is the species under review a vertebrate?

       Yes

  X   No, the DPS policy applies only to vertebrate species.

### 2.2 Recovery Criteria

**2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?**

*Yes*

*No*

**2.2.2 Adequacy of recovery criteria.**

**2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?**

*Yes*

*No*

**2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery?**

*Yes*

*No*

**2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:**

**1. There are at least four stable, self-sustaining populations in each of the 5<sup>th</sup> field watersheds (Peshastin Creek and Icicle Creek) where the species currently occurs.**

Alternatively, there could be three stable, self-sustaining populations in each of these watersheds and at least three additional stable, self-sustaining populations in another drainage if populations are discovered in the future. Additional populations may be identified through additional surveys or established through reintroductions. To be considered stable and self-sustaining, a population should maintain a 5-year average of at least 500 adult plants, show evidence of positive or neutral population growth over the same 5-year period, and show evidence of natural reproduction and establishment.

This criterion has not been met to date. Currently, only two of the five extant self-sustaining sites, Camas Meadow and Mountain Home, are stable or improving, and include at least 500 flowering individuals. These two populations are located in Peshastin and Icicle Creek watersheds, respectively (see Table 1.) The Mountain Home population in the Icicle Creek drainage has been found to be much larger than originally estimated. Results from a population count in 2011 estimated over 2,548 plants, including 2,475 flowering, 60 vegetative, and 13 juveniles (Joseph Arnett, Rare Plant Botanist. [WDNR], Natural Heritage Program, Olympia, Washington, pers. comm., 2011). The recovery plan cited a count in 2001 of only 300 plants. The landowners have shown an interest in maintaining the population, but are not currently willing to commit to taking on the entire burden of stewardship, as periodic control of encroaching trees, shrubs, and invasive grasses will likely be necessary at the site.

**2. All of the stable, self-sustaining populations are on protected sites secure from threats.**

For a site to be considered protected, it must be owned or managed by a government agency or

private conservation organization that identifies perpetual maintenance of the species as the primary management objective for the site, or the site must be protected by a permanent conservation easement or covenant that commits present and future landowners to the conservation of the species.

**Table 1.** Revised Summary of Known Sites for *Sidalcea oregana* var. *calva*.

| Site Name                  | Population Size (Survey Year)          | Occupied Area                                | 5-year Trend in Population Size              | Land Ownership                                 |
|----------------------------|--|--|--|--|
| Camas Meadows <sup>1</sup> | 11,000 estimated <sup>2</sup> (2000)   | 14 to 20 hectares (35 to 50 acres)           | stable <sup>2</sup>                          | WDNR <sup>3</sup> , WNF <sup>3</sup> , private |
| Mountain Home <sup>1</sup> | > 2,548 (2011)                         | less than 0.4 hectares (greater than 1 acre) | increasing                                   | private  |
| Pendleton Canyon           | 160 (2001)                             | less than 0.4 hectares (less than 1 acre)    | unknown; discovered in 1999                  | private  |
| Camas Creek Tributary      | 8 (2001)                               | less than 0.4 hectares (less than 1 acre)    | trend unknown; rediscovered in 2001          | private  |
| Forest Service             | 43* (2004)<br>*only 2 flowering adults | less than 0.4 hectares (less than 1 acre)    | increasing; based on occasional observations | WNF  |

<sup>1</sup> Portions of these populations are in the voluntary registry program administered by The Nature Conservancy and the Washington Department of Natural Resources.

<sup>2</sup> The large area and patchy distribution of the Camas Meadows population make accurate estimates difficult to census to date. However, this population appears stable, or increasing (D. Wilderman, pers. comm. 2004).

<sup>3</sup> WDNR = Washington Department of Natural Resources; WNF = Wenatchee National Forest, Leavenworth Ranger District.

This criterion has not been met. Currently, only one of the known populations with greater than 500 flowering plants (Camas Meadow) is stable, or improving and on a legally protected site. In light of the discovery of a much larger, stable Mountain Home population, the Technical Team is likely to reconsider the value of this population to the recovery of the species, and the Service may pursue a conservation agreement with the landowners. The final designation of critical habitat for the species (USFWS 2001) did not consider the Mountain home population as

essential to the survival and recovery of *Sidalcea oregana* var. *calva* because it was thought to be small at the time (approx. 200 plants), at a high risk of extirpation, and was genetically and geographically isolated from all other known populations. Additionally, the Mountain Home population is important as it represents a significant source of genetic variability for *S. oregana* var. *calva*, and therefore elevates its priority as a source of seed for propagation and reintroduction efforts of the species.

**3. Genetic material is stored in a facility approved by the Center for Plant Conservation.**

The stored genetic material in the form of seeds must adequately represent the species’ geographic distribution and genetic diversity.

Although genetic material is stored in an approved facility, the stock of seed is aging and is not representative of the genetic diversity and geographic distribution of *Sidalcea oregana* var. *calva*, therefore this criterion has not been met. This criteria remains a high priority for completion because the current accessions are ageing, represent only the Camas Meadows population, and are located only in a single storage location. To date, the stock of seed currently representing the species is stored at the Berry Botanic Garden in Portland, Oregon (see Table 2.). Seed for rare plants are commonly stored in more than one location to reduce the risk of the loss of the entire seed bank for a species in a single catastrophic event.

Table 2. Seed Accessions of Berry Botanic Garden of *Sidalcea oregana* var. *calva* since 1986 (Source: Wendy Gibble, Program Manager, University of Washington Center for Rare Plant Care and Conservation [Rare-Care], Pers. Comm., 2011)

| Year | EO # | # seeds | Site   |
|------|------|---------|--|
| 1986 | 9    | unknown | Brushy Road left, just north of bend in Little Camas Creek on outskirts of Camas Land; Transect 3  |
| 1999 | 9    | 214     | Camas Land - just off road that leads to Camas Meadows Bible Camp; Transect 1                      |
| 1999 | 9    | 189     | Poison Canyon; on flat ridge above Brisky, Tripp and Poison Canyons, NE of Camas Land, Transect 2  |
| 1999 | 16   | 492     | Pendleton Canyon   |
| 1999 | 9    | 281     | Brushy Road right, just north of bend in little Camas Creek on outskirts of Camas Land; Transect 4 |

A complete population count and seed collection at the Mountain Home population was the focus of 2011 activity. Expanding this effort to include all known sites is a priority for 2012. Seed collection from this work will refresh the seed bank and include an additional storage facility; the Center for Urban Horticulture at the University of Washington, Seattle, Washington. Additionally, the planned collections and census will help focus the reintroduction efforts for *Sidalcea oregana* var. *calva*. Seed collections will be augmented if new populations are discovered or if research determines gaps in the representation of genetic diversity, or if viability tests indicate that additional accessions are needed.

**4. Adequate population and habitat monitoring has been established for all of the known populations.** Population monitoring must be statistically sound and should detect a 20

percent change in the population size with a 90 percent degree of certainty. Habitat monitoring should include monitoring of shrub and tree cover, nonnative species, and hydrology.

This criterion has not been met. There are several monitoring efforts designed and started at Camas Meadows, mostly to assess the response of *Sidalcea oregana* var. *calva* to WDNR management activities, such as prescribed fire, fuels treatments, and restoration of hydrology within the meadow. Transects were originally set up by WDNR and USFS in 2000, between the listing of the species and the publication of the recovery plan, and monitored annually by USFS for five years. These plots were intended to be monitored with a new protocol at an expanded interval (2-3 years), but have not been visited since then, due to staffing and workload issues (Lauri Malmquist, Botanist, Wenatchee National Forest [WNF], U.S. Forest Service [USFS], Leavenworth, Washington, pers. comm., 2011). In 2004 and 2005, Florence Caplow and David Wilderman (WDNR, Natural Heritage Program) set up three new plots to support monitoring called for in the recovery plan. Due to severe budget constraints and personnel changes, these plots have not been monitored since that time (David Wilderman, Natural Area Preserve Scientist, WDNR, Olympia, Washington, pers. comm., 2011) and the data has not been fully analyzed (L. Malmquist, pers. comm. 2011).

**5. Management plans have been developed and implemented for all State and federally owned populations.** Management plans will include provisions for monitoring, research, and habitat restoration and management, including hydrologic restoration and reporting. These plans will also define actions designed to reduce or control threats to the species.

This criterion has been partially met. The Camas Meadows population is the largest population, last counted in 2000 at approximately 11,000 plants. This population is mostly contained within a WDNR Natural Area Preserve (NAP), providing the agency some management flexibility for *Sidalcea oregana* var. *calva*. Since the recovery plan (USFWS 2004) was published in 2004, a final management plan for the Camas Meadows NAP has been developed and is implemented as funding allows (D. Wilderman, WDNR, pers. comm., 2011). This plan contains provisions for monitoring, research, and restoration of habitat and hydrology. Because this is the largest population, and appears to be the most stable, this plan is adequate and will serve the species into the future. However, a current, comprehensive management plan including actions for all protected populations, with funding for implementation is needed. A management plan for the USFS locations and habitat for *Sidalcea oregana* var. *calva* has been outlined in draft, and is awaiting completion and approval (L. Malmquist, WNF, pers. comm. 2011).

In 2009, a spotlight species action plan (USFWS 2009) was developed for *Sidalcea oregana* var. *calva* by the Service as a product of the endangered species strategic planning process. An action plan is the mechanism by which the Service will identify measureable 3-5-year targets, lay out the means to reach the target, and ultimately, to inform the Office of Management and Budget (OMB) and Congress on how effective the Service is in implementing the Endangered Species Act. The action plan for *Sidalcea oregana* var. *calva* contains the following two priorities:

1. Seek to establish self-sustaining populations by protecting occupied sites and securing sites from threats, in each watershed where the species currently occurs.

2. Assure that adequate population and habitat monitoring occurs for all of the known populations.

The target is further summarized in a single measure: Increase and monitor populations and distribution. The action plan lists eight actions, based on actions or grouped actions summarized in the implementation schedule in the recovery plan (USFWS 2004).

## **2.3 Updated Information and Current Species Status**

### **2.3.1 Biology and Habitat**

#### **2.3.1.1 New information on the species' biology and life history:**

In 1987, and 2001, researchers observed that weevils had eaten the majority of the seeds that had been produced (Gamon 1987; L. Malmquist, pers. comm. 2001; Goldsmith, 2003). In recent research by Arnett and Birkhauser (2008), two different species of native weevils were observed and tentatively identified as *Macrorhoptis niger* and *Anthonomus phaealceae*; other insect species, especially aphids, were abundant and apparently feeding on the plants. Seed predation levels by weevils on *S. oregana* var. *calva* ranged from 25.9 to 59.4 percent; considerably lower than that observed by Goldsmith (2003), ranging from 62 to 78 percent. Seed loss related to other insects, presumably the aphids, ranged to above 70 percent. Arnett and Birkhauser (2008) proposed a practical and simplified methodology for monitoring the level of this predation, with the long term objective of being able to discern the effects of different management or naturally occurring events on weevil populations. The methodology was developed through a series of monitoring trials in seven plots of *S. oregana* var. *calva*, using a total of thirteen samples.

#### **2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:**

The Mountain Home population in the Icicle Creek drainage has been found to be much larger than originally estimated. After a fuels reduction project undertaken by the private landowners to mow and clear forest understory, numerous additional *Sidalcea oregana* var. *calva* plants appeared the next season (L. Malmquist, WNF, pers. comm., 2011) and appear to have been increasing. Results from a population count in 2011 estimated over 2,548 plants over an area larger than one acre (0.4 hectare). The recovery plan (USFWS 2004) cited a count in 2001 of only 300 plants present in a small linear area less than an acre (0.4 hectare), and as of 2004 there were approximately 25 to 30 reproductive adults and 10 juvenile vegetative plants present (L. Malmquist, WNF, pers. comm. 2004). It is unknown if previous counts looked beyond the roadside, or if the plants

were suppressed or obscured by an overabundance of vegetative cover, and not counted. It is likely the reduction of canopy (shade) and vegetative competition produced, (or resulted in) a substantial increase in number of plants and occupied area.

One of the extant sites for *Sidalcea oregana* var. *calva* reported in the recovery plan (USFWS 2004), was reported in error as being managed by WDNR. The site is actually in private ownership, leaving only two populations in legally protected ownership. The Camas Creek Tributary site, thought to no longer support *Sidalcea oregana* var. *calva*, and “rediscovered” in 2001, was reported to have only eight plants at that time and as such, may not contribute significantly to the survival and recovery of the species.

On September 21, 2011 seed was collected from *S. oregana* var. *calva* at the Mountain Home site, yielding a yet unreported number of seeds. A larger collection, representative of Peshastin watershed populations and isolated groups of plants is planned for 2012.

#### **2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):**

Based on the size and stability of the known populations, and the life history of *Sidalcea oregana* var. *calva* (a long-lived perennial that occupies relatively stable habitats), a population that maintains at least 500 flowering plants is presumed to be viable for this taxon, although a population viability analysis has not been completed. Because our present knowledge of the biology of the species remains somewhat limited, research to gather key information about the stressors affecting population viability for this species is a key component of the recovery strategy. However, there has been no research to generate updates or changes for *S. oregana* var. *calva* related to the genome (all of the hereditary information of an organism that is encoded in the DNA [Deoxyribonucleic acid] of the species) (<http://www.wordiq.com>).

#### **2.3.1.4 Taxonomic classification or changes in nomenclature:**

The taxon was first recognized as a distinct variety named *Sidalcea oregana* ssp. *oregana* var. *calva* by Hitchcock and Kruckeberg (1957). Hitchcock and Cronquist (1973) later simplified the nomenclature by eliminating the subspecies *oregana*, and all subordinate taxa of *S. oregana* became varieties of the species. No further revisions have been made for *S. oregana* var. *calva* related to either taxonomy or relevant nomenclature for the species.

#### **2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or**

**historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):**

In 2011, the Wenatchee National Forest entered into an agreement with the Chelan-Douglas Land Trust (CDLT), to combine efforts on potential *Sidalcea oregana* var. *calva* habitat located on their respective, adjoining ownerships less than one mile (1.6 kilometers) from the Mountain Home population in the Icicle Creek Watershed. This project was begun with a Service partnership with CDLT (Partners for Fish and Wildlife Program) on a restoration and reintroduction project initiated in 2009. Site preparation and a seed collection were begun in 2011, with the initial outplanting expected in the spring of 2012. The goal of the project for this site is to meet recovery criterion #1, which is to maintain a stable population of over 500 individuals over five years.

**2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):**

Surface hydrology appears to determine the location of *Sidalcea oregana* var. *calva* plants in the broader landscape. At Camas Meadows, natural drainage channels have been altered to direct water away from the primary wet meadow area for agricultural purposes (Gamon 1987; D. Wilderman, pers. comm. 1997). Restoration work by the WDNR in partnership with the Service within the Camas Meadows Natural Area Preserve has improved hydrology of the wetland habitat in the meadow. A pilot project was designed and implemented, beginning in 2004 to slow or stop several headcuts occurring in the meadow. High volumes of flowing water were eroding upstream from old ditches stemming from the natural historic stream channel during the spring runoff period. Temporary dikes made of staked straw bales and large straw waddles were installed perpendicular to the flow to spread out and reduce the erosive potential of the water, and were planted with native herbaceous plants. The result of these actions restored several acres of wetted habitat, which produced numerous *Sidalcea oregana* var. *calva* plants the next spring and rapidly shifted the area to a higher diversity of native species (D. Wilderman, WDNR, pers. comm. 2011).

Timber harvest, particularly large-scale removal of overstory trees, may impact *Sidalcea oregana* var. *calva* by increasing erosion and modifying hydrologic function. Recent observations by the USFS indicates that only the ground-disturbing aspects of timber harvest threaten the species, and that the attendant removal of overstory and competing vegetation appears to benefit the species and stimulate germination and growth. Prescribed fire post-timber harvest may also benefit the species. A timber harvest and prescribed fire project in 2005 established “no-activity” areas where entry was restricted because of the presence of *S. oregana* var. *calva* plants. After the project was complete, plants within those areas continued to experience suppressed growth and vigor due to overstory development and

vegetative competition. Outside the no-activity areas, one area was cleared and used for burning a slash pile which sprouted “numerous” *S. oregana* var. *calva* plants the next spring, where there were none before (L. Malmquist, WNF, pers. comm., 2011). On a visit to the same site in 2011, the plants were reported to be particularly “dense and vigorous” (J. Arnett, WDNR, pers. comm., 2011). Further support for prescribed fire treatments was recommended based on observations at the Mountain Home population, where new plants emerged as “fairy rings” growing in circles around several historic burn piles

#### **2.3.1.7 Other: N/A**

### **2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)**

#### **2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:**

Habitat for this species may be degraded or destroyed by residential or agricultural development through modifications such as alterations in hydrology, introduction of nonnative grasses, conversion of meadows to agricultural uses including pasture land and gardens, and road construction (Gamon 1987; D. Wilderman, pers.comm.1997). A restoration project by the WDNR in partnership with the Service at Camas Meadows has improved wetland habitat in the largest population of *Sidalcea oregana* var. *calva*. In addition, the project restored native plant diversity to several areas drained historically for agriculture. These actions appear to have reduced the threat of altered hydrology within this population of *S. oregana* var. *calva*. This project also established a successful method for restoring the (hydrology of the wetland to benefit the species. Some areas of headcutting remain to be addressed for a future project, along with some of the remnant drainage ditches.

Wildfire suppression is likely both a direct and indirect source of habitat degradation or loss for *Sidalcea oregana* var. *calva*. In the absence of fire to set back succession, woody plants encroach the moist montane meadows preferred by this species, altering the hydrology, availability of sunlight, and nutrients. Fire suppression activities may also result in direct mortality to *S. oregana* var. *calva* by crushing or burying plants and seed. Use of heavy equipment in moist areas may easily alter the hydrology, soil structure and patterns of runoff.

Direct observations of the negative effect of fire suppression activities on *S. oregana* var. *calva* habitat by the USFS and others may have reduced the risk of this threat. It is likely in the future that prescribed fire plans will not seek to avoid areas containing *S. oregana* var. *calva*. Strategic thinning

or timber harvest coupled with prescribed fire of some forest stands may benefit *S. oregana* var. *calva* if intended to decrease shrub and tree encroachment due to fire suppression, reverse plant succession, and increase light penetration at occupied sites (D. Wilderman, pers. comm. 2004). Timber harvest planning will accordingly be allowed to remove more overstory, while limiting ground disturbance near and within the species' habitat. This can be accomplished through common alternative methods, such as logging over snow (L. Malmquist, WNF, pers. comm., 2011), further reducing both the imminence and magnitude of these threats.

The introduction of nonnative plants, and particularly grasses, likely pose a threat to *Sidalcea oregana* var. *calva* through competition for resources. The WDNR has undertaken several projects to control invasive species within and around the periphery the Camas Meadows population. In 2011, the NAP received 26 acres of invasive species control (D. Wilderman, pers. comm. 2004). Although the threat is currently reduced due to these treatments, this action appears to be an ongoing need at Camas Meadows.

Other threats reported in the recovery plan (USFWS 2004) for this factor, such as land development, road construction, and septic systems have not had effects reported to the species since the development of the recovery plan.

#### **2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:**

*Sidalcea oregana* var. *calva* does not appear to be at risk from commercial activities. Recreational use of public areas where it is known to occur, such as Camas Meadows NAP, may continue to present a risk associated with incidental flower picking, and trampling. Natural Area management continues to work to integrate conservation and recreational use of this and other similar sites.

Because the current seed accessions are ageing and likely are becoming less viable, do not represent the Mountain Home population, and are located only in a single storage location, the risk to *Sidalcea oregana* var. *calva* is elevated. Commonly seed accessions for rare plants are stored in more than one location to minimize the risk of the loss of the entire seed bank for a species in a single catastrophic event. The collection and storage of seed is therefore, a top priority for recovery activities in 2012. The collection of seed for research and utilization of the species for educational purposes should be continued in consultation with the Technical Team. Any collection or utilization of the species should be respectful of a private landowner's desire for privacy. Permission to access any private lands should be requested and granted prior to

conducting these actions.

#### **2.3.2.3 Disease or predation:**

Recent studies have verified that loss of *S. oregano* var. *calva* seeds due to weevil predation is high, and may have substantial negative impacts on the reproductive capacity of the plant (Goldsmith 2003, Arnett and Birkhauser 2008). Seed predation by weevils on *S. oregana* var. *calva* ranged from 25.9 to 59.4 percent (Arnett and Birkhauser 2008); considerably lower than that observed by Goldsmith (2003), which ranged from 62 to 78 percent. Seed loss related to other insects, presumably aphids, ranged to above 70 percent. Although this work informs our understanding of the species, it does not inform the level of threat. It is unknown if the current levels of weevil infestation are different than historic or “natural” levels, or how this relationship interacts with the host of other insects known to use *S. oregana* var. *calva*. Until new information becomes available, the imminence and magnitude of this threat will remain the same.

#### **2.3.2.4 Inadequacy of existing regulatory mechanisms:**

Critical Habitat was determined to be prudent for *Sidalcea oregana* var. *calva* at the time of listing (USFWS 1999). The final rule to list the species as endangered has not been revisited in regards to designation of critical habitat. Beyond the protections afforded to the species through section 7 consultation for proposed Federal actions that are authorized, funded, or carried out by Federal agencies there is little additional protection given to the species through other means. The Endangered Species Act (Section 9 (a) 2) does not prohibit the take of listed plants on private land.

The designation of critical habitat for *Sidalcea oregana* var. *calva* (USFWS 2001) did not include the Mountain Home population as essential to the survival and recovery of the species, because it was thought to be limited in size, numbers, and was isolated from all other known sites. With the discovery of a much larger, stable Mountain Home population than previously thought, it may be more beneficial to the species in the long term to pursue a conservation agreement with the landowners, with a goal of providing protection and stewardship for *Sidalcea oregana* var. *calva* into the future.

The Washington Natural Heritage Program of the WDNR has classified *Sidalcea oregana* var. *calva* as an endangered species. This classification provides no direct protection to threatened or endangered plants or the habitats upon which they depend. The only protections provided to plants are the prohibitions specifically related to State criminal trespass law on private lands.

### **2.3.2.5 Other natural or manmade factors affecting its continued existence:**

Frequently as a response to fragmentation and isolation, impaired ecological function may occur when occupied patches become too small and the distance between patches exceeds the dispersal abilities of pollinators. The suppression of these processes may cause small, isolated patches of *Sidalcea oregana* var. *calva* to become extirpated. Additionally, small populations may be at risk of inbreeding depression; as patches get smaller and more isolated from adjacent populations, the local pool of genetic material shrinks, potentially resulting in a loss of resilience to environmental change. Small populations are also at risk of extirpation due to stochastic events, such as unusually dry years, and unseasonal wildfires.

The numbers of plants are so low in some *Sidalcea oregana* var. *calva* populations that they may not be viable, and little opportunity apparently exists for genetic exchange with other populations. The Mountain Home Meadow population is isolated from all other known populations. The remaining populations, except for Camas Meadows are isolated from each other and most have fewer than 300 plants and remain vulnerable to many of these same threats. Therefore, the threat as reported in the recovery plan, due to low numbers of *S. oregana* var. *calva* individuals in some populations remains high.

An outstanding deficiency in population data is the lack of complete, accurate counts of the Camas Meadows population over time. An estimated 11,000 individuals occur there, covering an approximate area of 14 to 20 hectares (35 to 50 acres). The Camas Meadows population has proven difficult to accurately census due to its large size and scattered spatial arrangement of plants therefore annual census data have not been collected to date (D. Wilderman, pers. comm., 2011). In addition to being difficult, an accurate census, repeated over time is expected to be expensive and time consuming. Therefore, the procurement of dedicated funding for a multi-year census protocol is a high priority need for this population of *Sidalcea oregana* var. *calva*.

One threat that has appeared in recent years and was not addressed in the original listing rule (USFWS 1999) or recovery plan (USFWS 2004) was the potential effects to the species as a result of climate change. The impacts of a changing climate to *Sidalcea oregana* var. *calva* are presently unclear, though they could pose a significant threat, as the species is reliant on seasonal runoff and elevated soil moisture. All regional models of climate change indicate that future climate in the Pacific Northwest will be warmer than the past and together, they suggest that rates of warming will be greater in the 21st century than those observed in the 20th century.

Projected changes in annual precipitation, averaged over all models, are small (+1 to +2 percent), but some models project an increased seasonal precipitation cycle defined by changes toward wetter autumns and winters and drier summers (Littell, et al. 2009a).

Analysis of two regional climate projection models by Littell (2009b) suggest the area of Washington forest that is severely water-limited will increase by 32 percent in the 2020s, and an additional 12 percent in both the 2040s and the 2080s. The foothills of the northeastern Cascades contain most of the area that climate projections indicate will transition from energy- to water-limited forest by the 2080s (Stöckle et al. 2009). In areas where forests are not water-limited, future growth will continue to vary with interannual climate variability, but in places where forests are not water-limited, growth is likely to decline due to projected increase in summer potential evapotranspiration (<http://ces.washington.edu/cig/res/fe/waforests.shtml>). The projected warming trend will increase the number of frost-free days throughout the state, increasing the growing season for plants, which will generally be limited in eastern Washington by water availability. Weeds and insects are expected to adapt to the longer season with more favorable conditions (Stöckle et al. 2009). However, regional climate models suggest that some local changes in temperature and precipitation may be quite different than average regional changes projected by the global models (Littell, et al. 2009a).

Littell, et al. (2009b) were successful in developing statistical models of area burned for six regions in Washington for the period 1980-2006. Future projections from these six models project mean area burned increase of between 0 and 600 percent, depending on the ecosystem type, the sensitivity of the fire model, emissions scenario and the time frame of the projection. In forested ecosystems (Eastern Cascades, Okanogan Highlands, Blue Mountains) the mean area projected to burn [by the 2040's] may increase by a factor of 3.8 compared to 1980-2006. Notably, the increase in area burned is accompanied by an increase in variability in some of the more arid systems such as the Columbia Basin (Littell, et al. 2009b).

Despite the lack of site-specific data, increased average temperatures and reduced average rainfall may further exacerbate the current decline of the species and result in additional loss of habitat. Hotter and drier summer conditions may also increase the frequency and intensity of fires in the area, and invasive plants may respond positively as they may be better competitors for resources than *Sidalcea oregana* var. *calva*. Warmer, wet winters could benefit the species by extending the growing season and providing additional moisture to the soil in the spring. If frequency, intensity, and timing of the predicted changes in climate for eastern

Washington are not aligned with the phenology of *S. oregana* var. *calva*, the survival and recovery of the species may clearly be vulnerable to climate change over time.

Other threats reported in the recovery plan (USFWS 2004) for this factor, such as recreational trampling, and dust from gravel roads have not been observed to negatively affect the plants reported to the Technical Team since publication of the recovery plan in 2004.

## 2.4 Synthesis

The status of *Sidalcea oregana* var. *calva* has improved slightly in the years since publication and implementation of the recovery plan began in the spring of 2005, although all indications of improvement in the status of the species are mixed. The population at Mountain Home, discovered to be much larger than previously thought, indicates that additional property with individual plants, groups, populations, perhaps large ones, may yet be detected. Conversely, the known small populations have not been noted to increase in size or vigor and remain at risk of extirpation.

Its present distribution and abundance indicate that *Sidalcea oregana* var. *calva* is still endangered, and that a risk of the species becoming extinct in the foreseeable future remains. The likelihood that this species can be recovered remains moderately high. Despite seed predation by weevils and other insects, the species has demonstrated its ability to respond to improvements in habitat conditions, perhaps because the species is capable of reproducing through rhizomatous growth. The variety *S. oregana* var. *calva* is relatively easy to propagate from seed in a nursery using cold stratification, however, establishing plants in the field from seed or seedlings has not been attempted (W. Gible, Pers. Comm., 2011). A project is under way in the Icicle Watershed to establish seedlings in restored suitable habitat under the stewardship of the Chelan-Douglas (Counties) Land Trust during the spring of 2012.

The greatest challenges to survival for the species are: (1) low numbers of individuals in most of the populations; (2) vulnerability of the species to competition from nonnative invasive plants and native woody plants; (3) landscape-level fire suppression; and, (4) the potential loss of habitat due to human development. The cumulative effect of these on-going threats to establishing plants in the wild is a challenge for this species, even on lands that are dedicated to conservation of this species, such as the Camas Meadows NAP.

Since the development of the recovery plan (USFWS 2004), our understanding of the ecology and biology of the species has increased. Observations of post-fire effects of prescribed fire on this species indicate that the species is fire-adapted. Based on observations after controlled burns, the resulting removal of overstory and competing vegetation appears to benefit the species and stimulate germination and growth, (L. Malmquist, WNF, pers. comm., 2011) and likely improves the hydrology of these meadows.

In other situations, grass, shrub, and tree removal (either due to fire or mechanical removal) has increased the amount of suitable habitat and the number of *S. oregana* var. *calva* plants. Tree and shrub removal at the Camas Meadows, the USFS, and the Mountain Home sites has stimulated an increase in population size and led to an increasing population size at Mountain Home Resort. Research on weevil predation has demonstrated how little is known about the ecological relationships of *S. oregana* var. *calva* and the insects responsible for causing high seed loss. The need for continued research and monitoring in this area is highlighted as reintroduction efforts are planned, with a need to create habitat conditions that are not as suitable for weevils and aphids, yet remain useful and attractive to pollinators. Restoration actions by the WDNR within the Camas Meadows NAP has improved wetland habitat in the meadow. A pilot project started in 2004, was intended to slow or stop several headcuts within the meadow and resulted in restoring several additional acres of wetted habitat, which produced numerous *Sidalcea oregana* var. *calva* plants the next spring and rapidly shifted those same acres to a higher diversity of native species (D. Wilderman, WDNR, pers. comm. 2011).

Reintroduction efforts for *Sidalcea oregana* var. *calva* are in the initial stages, but much of the groundwork has been completed to move forward with a science-based, methodical approach to site selection and development. Reintroduction efforts will need to be well planned and implemented to be successful. Protection of, and conservation actions at, all currently extant populations of *Sidalcea oregana* var. *calva*, combined with the establishment of four to six additional viable populations within its historical range, appear to provide the best opportunity to recover this species.

### 3.0 RESULTS

#### 3.1 Recommended Classification:

**Downlist to Threatened**

**Uplift to Endangered**

**Delist**

*Extinction*

*Recovery*

*Original data for classification in error*

**No change is needed**

#### 3.2 New Recovery Priority Number: N/A

**Brief Rationale:**

#### 3.3 Listing and Reclassification Priority Number: N/A

**Reclassification (from Threatened to Endangered) Priority Number: \_\_\_\_\_**

**Reclassification (from Endangered to Threatened) Priority Number: \_\_\_\_\_**

**Delisting (regardless of current classification) Priority Number: \_\_\_\_\_**

**Brief Rationale:**

#### **4.0 RECOMMENDATIONS FOR FUTURE ACTIONS**

A comprehensive listing of actions such that, if implemented, they are expected to lead to the downlisting or delisting of *Sidalcea oregana* var. *calva* is discussed in the recovery plan (USFWS 2004) and appendices, including the recovery implementation schedule. New or enhanced actions, including adaptive management actions created as a result of this review are recommended as follows (in order of priority):

**A. Collect, distribute, and store seed in an approved Center for Plant Conservation Seed Bank facility for later grow-out and reintroduction**

The need for this action is considerable, given the current accessions are ageing, do not represent the Mountain Home population, and are located only in a single seed bank location, at the Berry Botanic Garden in Portland, Oregon. The currently stored collections date from 1986 to 1999. We would like to expand this to more than one seed bank location by adding the Miller Seed Vault at the University of Washington's Center for Urban Horticulture, Seattle, Washington.

**B. Census and monitor all populations**

Despite the best of intentions by responsible agencies, monitoring has been somewhat inconsistent between populations since publishing of the recovery plan. There has not been a full species census conducted in a single year to serve as a baseline for future comparisons and to allow the detection of trends. It is important to design a census that is efficient and comprehensive, yet be flexible to continue into the future in the face of uncertain funding. Cooperative development of a new monitoring plan is a challenge for the Technical Team.

**C. Continue research into insect predation**

Arnett and Birkhauser (2008) recommend repeating the proposed weevil protocol at several sites in order to develop an understanding of annual variation in level of insect infestation and to gain a better understanding of the annual variation in phenology. Trial runs early and late in the season may yield a better understanding of the different behavior of the two weevil species. A single late season monitoring was also suggested, as it may give the best estimate of the total level of insect damage, if it is conducted before seed dispersal begins. Arnett and Birkhauser (2008) suggested conducting prescribed fire at one of the *Sidalcea oregana* var. *calva* populations. This offers an opportunity to use this methodology to measure the effects of this action as a management treatment as the plant and the weevil likely evolved together under conditions of a higher fire frequency than current. Because *Sidalcea oregana* var. *calva* is historically located in areas where late-season, low-intensity burns occurred frequently (Caplow 2003, Goldsmith 2005), it could be predicted that the plant species would respond positively to fire, as it would reduce competition with encroaching shrubs and trees and increase plant vigor, as well as possibly keep populations of the weevil and other harmful insects in check.

**D. Complete hydrologic restoration in Camas Meadows**

The success of a pilot hydrologic restoration project at Camas Meadows has improved wetland function and increased the amount of habitat in the largest population of *Sidalcea*

*oregana* var. *calva*. In addition, the project was shown to improve native plant diversity and reduce the threat of altered hydrology within in the Camas Meadow population. This project demonstrated a successful method for restoring the hydrologic function to the wetland and provided benefits to the species. Several areas of headcutting still require attention in remnant drainage ditches and should be completed to help alleviate threats to *Sidalcea oregana* var. *calva*. Invasive species control and native restoration planting should accompany any hydrologic restoration undertaken with *S. oregana* var. *calva*.

**E. Reconsider value of Mountain Home population to survival and recovery**

With the discovery of a much larger, increasing and more stable Mountain Home population than previously thought, the Technical Team may reconsider the value of this population to the recovery of the species and we may elect to pursue a conservation agreement with the landowners. Such an action would allow the population to “count” toward recovery criteria # 1: a minimum of 500 plants, stable, and in a protected status; all for a period of at least five years. Additionally, this population is thought to represent a significant source of genetic variability for *S. oregana* var. *calva*, and therefore elevates its importance as a potential source of seed collection to propagate seedlings for reintroduction efforts or the species.

**F. Complete and refine reintroduction planning**

In the Spotlight Species Action Plan (USFWS 2009) is a list of actions, that if implemented, would make substantial gains toward the recovery of *Sidalcea oregana* var. *calva*. The Technical Team should review this document, update it to reflect the new information and insight from this status review and use it to guide the reintroduction of the species. The Action Plan was developed primarily by using information and actions directly taken from the recovery plan (USFWS 2004), and would likely benefit from a revision.

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## PERSONAL COMMUNICATIONS

Arnett, Joseph. Rare Plant Botanist. 2007-2011. Washington State Department of Natural Resources, Natural Heritage Division, Olympia, Washington.

Gibble, Wendy. 2011. Botanist and Program Manager, University of Washington Center for Rare Plant Care and Conservation [Rare Care], Seattle, Washington

Malmquist, Lauri. 2001, 2004, 2011. Botanist, Wenatchee National Forest, Leavenworth Ranger District, Leavenworth, Washington.

Wilderman, David. 1997, 2003, 2004. Natural Area Preserve Scientist, Washington Department of Natural Resources, Olympia, Washington.

**Signature Page**

**U.S. FISH AND WILDLIFE SERVICE  
5-YEAR REVIEW of :  
*Wenatchee Mountains Checker-mallow (Sidalcea oregana var. calva)***

**Current Classification:** Endangered

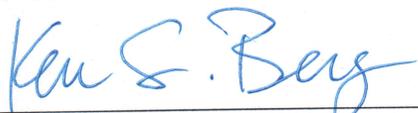
**Recommendation resulting from the 5-Year Review:**

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

**Appropriate Listing/Reclassification Priority Number, if applicable:** N/A

**Review Conducted By:** Tim McCracken, Central Washington Field Office, Wenatchee, Washington

**FIELD OFFICE APPROVAL:**

 Date 9/30/11  
**Manager, Washington Fish and Wildlife Office,  
U.S. Fish and Wildlife Service**