# **FINAL**

# ENVIRONMENTAL IMPACT STATEMENT

FOR THE

# HAYS COUNTY

# REGIONAL HABITAT CONSERVATION PLAN

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## MAY 1, 2010

**Type of Action:** Administrative

**Lead Agency:** U.S. Department of Interior,
Fish and Wildlife Service

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**Abstract:**

Hays County, Texas, is applying for an incidental take permit (Permit) under Section 10(a)(1)(B) of the Endangered Species Act of 1973 (Act), as amended, to authorize incidental take of two endangered bird species: the golden-cheeked warbler (*Dendroica chrysoparia*) and the black-capped vireo (*Vireo atricapilla*), collectively referred to as the "covered species." In support of the Permit application, the County has prepared a regional habitat conservation plan (RHCP) covering a 30-year period from 2010 to 2040. The permit area for the RHCP is Hays County, Texas. While the entire county would be covered by the proposed Permit, potential habitat for the covered species only occurs on the Edwards Plateau ecoregion located across the western approximately two-thirds of the county (generally west of Interstate Highway 35). The area of potential effect for this Environmental Impact Statement varies with the resource being considered, but typically includes the full extent of Hays County.

The requested Permit would authorize incidental take for the covered species associated with up to 9,000 acres of impact to potential golden-cheeked warbler habitat and up to 1,300 acres of impact to potential black-capped vireo habitat within Hays County over the 30-year duration of the plan. Mitigation for the impacts of authorized take would be provided by the conservation program of the RHCP. The RHCP conservation program could also benefit 56

other potentially rare or sensitive species in Hays County (i.e., the RHCP "evaluation" and "additional" species).

The RHCP conservation program uses a phased conservation banking approach with a goal of assembling between 10,000 and 15,000 acres of preserve land over the 30-year duration of the RHCP. The preserve system will be assembled on a phased basis as needed to create mitigation credits for the conservation bank and as potential preserve parcels become available from willing partners; there is no pre-determined preserve size, location, or configuration. Habitat for the covered species protected within the preserve system will create mitigation credits for the conservation bank. Banking mitigation credits would allow an equivalent amount of take authorization to be accessed. Therefore, mitigation would always be provided before an equivalent amount of take authorization could be used by the County or issued to RHCP participants. Defined processes for habitat determinations and mitigation assessments, as well as defined mitigation ratios, provide the basis for ensuring that mitigation is commensurate with impacts. Hays County will manage and monitor the preserve system for the benefit of the covered species in perpetuity, in accordance with the RHCP and terms of the Permit.

As part of the RHCP conservation program, the County will implement various other measures to avoid or minimize impacts to the covered species, including disseminating maps of potential habitat for the covered species, requesting subdivision or development applicants to provide information about endangered species within their project areas, requiring RHCP participants to implement measures that help prevent the spread of oak wilt and to observe seasonal restrictions on clearing and construction in or near habitat for the covered species, and implementing a public education and outreach program. The County will also dedicate funds for research or studies of one or more of the RHCP evaluation species.

The RHCP includes a funding plan that estimates the cost of implementing the conservation program and identifies three types of resources to provide revenue for RHCP implementation: 1) participation fees charged to RHCP participants; 2) annual contributions from County tax revenues; and 3) conservation investments from the County or other sources. Other funding sources, such as grants or debt financing may also be available, but are not modeled in the funding plan.

The natural resource and socioeconomic impacts associated with implementing the proposed RHCP have been described and assessed in this EIS. In developing the RHCP, a number of alternatives were considered, including the No Action alternative, a Moderate Preserve/Limited Take alternative, and a Large-scale Preserve alternative.

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# EXECUTIVE SUMMARY

This Environmental Impact Statement (EIS) describes potential impacts of the proposed action. The proposed action is the issuance of a permit under Section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (ESA), by the U.S. Fish and Wildlife Service (Service) to Hays County, Texas, to authorize incidental take of the endangered golden-cheeked warbler (*Dendroica chrysoparia*) and black-capped vireo (*Vireo atricapilla*) within the context of the proposed Hays County Regional Habitat Conservation Plan (RHCP).

The lead Federal agency with responsibility for issuing the requested incidental take permit is the Service. The area of potential effect for this EIS is Hays County, Texas.

**Purpose and Need**

The Proposed Action has both ecological and socioeconomic purposes. The primary ecological purposes of the proposed action are to: 1) support populations of the covered species in Hays County by protecting and managing habitat for these species in perpetuity; 2) contribute to and facilitate the recovery of the covered species in Hays County; and 3) to contribute to the conservation of the 16 other Federally listed and unlisted species that are addressed in the RHCP as "additional species." The socioeconomic purpose of the proposed action is to allow the proponents of otherwise lawful activities to comply with the ESA in a more efficient, effective, and coordinated manner than might occur through individual project approvals.

As the population of Hays County continues to grow, the need for ESA compliance by public and private entities will likely increase. The need for the proposed action is based on an expected increase in population and associated land development activities and other land use changes in Hays County that have the potential to result in take of golden-cheeked warbler and black-capped vireo that either does not comply with the ESA or complies in a less efficient, less coordinated manner than is possible without the Hays County RHCP.

**Scoping and Public Participation**

Formal scoping for this EIS began on May 16, 2008 with the publication of a Notice of Intent (NOI) to prepare the EIS in the Federal Register (Appendix A). The NOI also announced a public scoping meeting that was held on June 18, 2008 in San Marcos, Texas. In addition to the Federal Register notice, notices of the public scoping meeting were published in area newspapers, including *The Daily Record*, San Marcos, Texas (June 4, 2008) and *Hays County Free Press*, Kyle, Texas (June 4, 2008) (Appendix A). This information was also posted on the Hays County RHCP website (www.hayscountyhcp.com), and notification was sent to local, State, and Federal elected and public officials and agencies in the surrounding areas. Notification of the public scoping meeting and the opening of the public comment period for scoping comments were also sent to interested individuals subscribed to the RHCP's email list.

Six members of the public attended the public scoping meeting. The Service received four comments from the public during the public scoping meetings and no other comments were received by the Service. The official scoping comment period for the EIS extended from May 16, 2008 to July 18, 2008.

In addition to the public scoping process, Hays County also instituted two advisory committees: the Citizens Advisory Committee (CAC) and the Biological Advisory Team (BAT). These committees provided guidance to the County during development of the RHCP. All meetings of these committees were subject to the Texas Open Meetings Act and the Texas Open Records Act. As such, all committee meetings were officially posted by the Hays County Commissioners' Court, and agendas, materials, and minutes were posted on the RHCP website. The website also served as a vehicle for interested persons to submit comments, ask questions, and join an email list regarding the RHCP.

**Alternatives Considered**

This EIS considers for detailed study the environmental consequences of "no action" (i.e., the Service does not issue Hays County an incidental take permit and Hays County does not implement a regional HCP) and three action alternatives based on a regional HCP framework. The basic characteristics of each alternative are described below.

**Alternative A: No Action** – Under this alternative, the Service would not issue an incidental take permit to Hays County and Hays County would not implement a regional HCP.

**Alternative B: Proposed Hays County RHCP** – This alternative implements a regional HCP with a phased conservation banking approach. Under this alternative, the County would acquire habitat preserves over the duration of the plan (with a target acquisition goal of between 10,000 and 15,000 acres) and bank mitigation credits for the covered species. The County would then be able to use credits for its own projects or sell credits to RHCP participants for a corresponding amount of incidental take authorization for the covered species in Hays County. The total amount of incidental take authorization that would be allowed under this alternative would be sufficient to cover the anticipated need for such authorizations, based on estimates of land development, impacts to habitat for the covered species, and RHCP participation.

**Alternative C: Moderate Preserve/Limited Take** – This alternative features the acquisition of a modestly sized, pre-determined preserve system and limits the amount of incidental take that would be authorized by the incidental take permit. This alternative illustrates a conservation program that could be relatively easy for the County to afford, but (due to the relatively smaller size of the preserve system compared to the proposed RHCP) might not satisfy the anticipated need for incidental take authorization over the duration of the plan.

**Alternative D: Large-scale Preserve System** – This alternative involves a conservation program that utilizes a pre-determined preserve approach. Under this alternative, the preserve

system would be large enough to authorize the incidental take of any remaining golden-cheeked warbler or black-capped vireo habitat in Hays County outside of the target acquisition area of the preserve system during the duration of the plan.

**Comparison of the Alternatives Considered for Detailed Analysis.**

| Plan Characteristic | Alternatives | | | |
|---|---|---|---|---|
| | A - No Action | B - Hays County RHCP | C - Moderate Preserve/Limited Take | D - Large-scale Preserve |
| Conservation Strategy | Project-by-Project | Regional HCP with a Phased Conservation Bank | Regional HCP with a Pre-determined Preserve System | Regional HCP with a Pre-determined Preserve System |
| Incidental Take Authorization: | | | | |
| Golden-cheeked Warbler | unknown | 9,000 acres | 3,240 acres | 143,000 acres |
| Black-capped Vireo | unknown | 1,300 acres | 360 acres | 20,000 acres |
| Preserve Size | unknown | approximately 10,000 to 15,000 acres | 3,000 acres | 30,000 acres |
| Mitigation Ratio | likely 1 acre of mitigation for each acre of impact | typically 1 acre of mitigation for each acre of impact | typically less than 1 acre of mitigation for each acre of impact | typically less than 1 acre of mitigation for each acre of impact |
| Education and Outreach Program | No | Yes (for all species included in Table 1-1) | Yes (only for covered species) | Yes (for all species included in Table 1-1) |
| Public Access to Preserves | Not Likely | Yes - with limitations | Not Likely | Yes – with limitations |
| Conservation of Other Species | Not Likely | Yes | Not Likely | Yes |

Two additional alternatives were contemplated, but not considered for detailed study: a "regulatory alternative" based on creating regulations designed to either require or provide an incentive for the conservation of endangered species habitat and a "county-only alternative" that would only provide incidental take authorization for County projects.

**Affected Environment**

The description of the affected environment establishes the current environmental conditions considered by the Service to be affected by the alternatives. The impact topics or components of the human environment that are likely to be affected or could potentially be

affected beyond a negligible level by the authorized take, proposed mitigation, or funding and administration of the action alternatives are listed below. The area of potential effect of the action alternatives on the natural or socioeconomic resources analyzed in this EIS is Hays County, since the authorized take, proposed mitigation, and funding and administration of the action alternatives would occur only within Hays County. However, the potential significance of the effects of the action alternatives on the natural and socioeconomic resources may depend on the overall context of a particular resource that could extend beyond the boundary of the county.

The impact topics described and analyzed in detail in this EIS are (see Section 4.1.1):

- Water Resources: Important surface and groundwater resources occur throughout Hays County, and water quality and quantity issues are generally a concern for Hays County citizens. These water resources may also be essential habitat components for some listed species (although listed aquatic species are not covered for incidental take under the action alternatives). Water resources, where they overlap with potential habitat for the covered species, could be affected by activities that result in authorized incidental take of the covered species (primarily activities resulting in habitat loss) or by conservation measures proposed under the action alternatives.
- Vegetation: Vegetation could be affected within Hays County with the implementation of an action alternative, since take of the covered species would be expressed as a specified number of acres of potentially suitable habitat lost or modified, and because mitigation for that take would be the preservation and management in perpetuity of an equivalent amount of suitable habitat for the covered species.
- General Wildlife: Wildlife occupying the habitats that would be lost or modified as a result of activities covered for incidental take and areas protected and managed as mitigation could be affected by the action alternatives.
- Covered Species, Evaluation and Additional Species, and Other Special Status Species: Special status species include the two covered species, 40 evaluation species, 16 additional species, and a variety of other "special status" species in Hays County, such as the listed species in Hays County that are not addressed by the regional HCP alternatives. These species could be affected by the action alternatives in relation to the habitats that would be taken and protected.
- Socioeconomic Resources: While implementation of the action alternatives is not expected to affect overall county-wide trends for population growth, demographics, income, employment, or housing in Hays County (as described later, these socioeconomic factors are driven more by regional economic conditions than by local activities), these aspects of the human environment are important to understanding the interaction between people and the natural environment. Thus

these resources are considered in the analysis below. The action alternatives could also affect the ability of the County to provide services and could affect the cost of ESA compliance for project proponents in Hays County and for the Service.

As described in detail in Section 4.1.2, a variety of other resources or topics were considered but ultimately dismissed from further analysis. The resources or topics considered but dismissed from detailed analysis include energy and depletable resource requirements and conservation, prime and unique agricultural lands, public health and safety, archeological sites, historic structures, and other cultural resources, wetlands and floodplains, geology, ambient noise and air quality, and environmental justice concerns. These resources are not likely to be affected by the authorized take, proposed mitigation, or funding and administration of the action alternatives described above.

**Environmental Consequences**

National Environmental Policy Act (NEPA) regulations require the analysis of "no action" as a benchmark that enables decision makers to assess the magnitude of the environmental effects of the action alternatives (USFWS 2003). Under the No Action alternative, the current trends projected for human population growth and associated land development in Hays County will continue and impacts to listed species would be authorized under existing Federal programs. If no difference is anticipated between the future condition under the No Action alternative and the action alternatives, then there is no impact to analyze.

Overall, few projects are likely to find that a regional HCP makes all the difference in terms of when and where to develop. Therefore, it is reasonable to assume that the regional HCP action alternatives, compared to the No Action alternative, will have only minor impacts on county-wide extent, timing, and placement of development and any associated impacts to habitat for the covered species over the next 30 years. Since there would likely be no significant difference in land development patterns across the county under the No Action or the action alternatives, consideration of environmental consequences in this EIS is limited to the potential effects of the take that would be authorized by the requested permit, the proposed mitigation activities, or the funding and administration of the regional HCP alternatives.

While other Federal regulatory programs might trigger more comprehensive environmental assessment documentation for particular development projects, it is unlikely that a county-wide EIS-level review would be compiled. By contrast, this EIS provides a detailed environmental impact assessment of relevant impacts for the No Action and the action alternatives throughout the county. This means that if the proposed RHCP or one of the other action alternatives is implemented, the relevant impacts of all ESA compliance options will have been considered in this EIS. Although this does not relieve project proponents who choose options other than participation in a regional HCP from compiling necessary environmental impact assessments at the time they commence with their projects, it does provide assurance that a regional HCP is implemented with a full understanding of the possible impact scenarios,

regardless of the level of landowner participation in a regional HCP. This EIS will also serve as a valuable reference point for projects that do not use a regional HCP compliance option.

The EIS contains a resource-by-resource analysis of direct and indirect impacts for each of the affected resources and analyses of cumulative impacts, unavoidable adverse impacts, irreversible and irretrievable commitment of resources, and short-term use of the environment vs. long-term productivity. A summary of the anticipated impacts of the No Action and three regional HCP alternatives is provided below.

**Summary and Comparison of Environmental Effects for Alternatives.**

| | Alternative A – No Action | Alternative B – Proposed Hays County RHCP | Alternative C – Moderate Preserve/Limited Take | Alternative D – Large-scale Preserve System |
|---|---|---|---|---|
| Analysis Context | Land development trends would continue as projected converting approximately 57,700 acres to developed uses and affecting approximately 25,300 acres of potential habitat for the covered species over 30 years, with ESA compliance via individual authorizations from the Service. | Land development trends would continue as projected, with incidental take authorization provided by the RHCP for approximately 10,300 acres of impact to potential habitat for the covered species (sufficient to address the anticipated needs of the County and other likely RHCP participants over 30 years). | Land development trends would continue as projected, with incidental take authorization provided by the RHCP for approximately 3,600 acres of impact to potential habitat for the covered species (sufficient to address the anticipated needs of the County and a portion of the needs of other likely RHCP participants). | Land development trends would continue as projected, with incidental take authorization provided by the RHCP for impacts to any potential habitat for the covered species located outside of the target preserve system (as much as approximately 163,000 acres of impact) by the County or other RHCP participants over 30 years. |
| Water Resources | Generally adverse effects from land development activities on quality and quantity of surface and groundwater moderated by existing regulatory programs and mitigation from individual ESA authorizations – overall **minor to moderate adverse effects**. | Potential adverse effects from land development activities similar to No Action. RHCP conservation program resulting in **negligible to minor positive effects** to water resources, compared to No Action. | Potential adverse effects from land development activities similar to No Action. Relatively small scale of the alternative conservation program resulting in **negligible positive effects** to water resources, compared to No Action. | Potential adverse effects from land development activities similar to No Action. Large scale of the alternative conservation program resulting in **minor to moderate positive effects** to water resources, compared to No Action. |

**Summary and Comparison of Environmental Effects for Alternatives.**

| | Alternative A – No Action | Alternative B – Proposed Hays County RHCP | Alternative C – Moderate Preserve/Limited Take | Alternative D – Large-scale Preserve System |
|---|---|---|---|---|
| Vegetation | Anticipated land development to generally reduce the extent and sustainability of native vegetation communities but moderated by other park/open space initiatives and individual ESA authorizations – overall **moderate adverse effects**. | Potential adverse effects from land development activities similar to No Action. RHCP conservation program would target forest habitats for protection and management resulting in a **moderate beneficial effect** to vegetation, compared to No Action. | Potential adverse effects from land development activities similar to No Action. Relatively small scale of the alternative conservation program (also targeting forest habitats for protection and management) resulting in a **minor beneficial effect** to vegetation, compared to No Action. | Potential adverse effects from land development activities similar to No Action. Large scale of the alternative conservation program (targeting primarily forest habitats for protection and management, but also likely to include other communities) resulting in a **moderate beneficial effect** to vegetation, compared to No Action. |
| General Wildlife | Anticipated land development to generally reduce habitats, introduce non-native species, and disrupt the balance of natural wildlife communities; however, some urban-adapted species could benefit. Adverse effects moderated by existing regulations, other parks/open space programs, and individual ESA authorizations. Overall **moderate adverse effects** to native wildlife communities. | Potential adverse effects from land development activities similar to No Action. RHCP conservation program, including preserve acquisitions, preserve management, and public education program, to result in **moderate beneficial effect** to native wildlife communities, compared to No Action. | Potential adverse effects from land development activities similar to No Action. Relatively small scale of alternative conservation program to result in **minor beneficial effect** to native wildlife communities, compared to No Action. | Potential adverse effects from land development activities similar to No Action. Large scale of the alternative conservation program resulting in a **moderate beneficial effect** to native wildlife communities, compared to No Action. |

**Summary and Comparison of Environmental Effects for Alternatives.**

| | Alternative A – No Action | Alternative B – Proposed Hays County RHCP | Alternative C – Moderate Preserve/Limited Take | Alternative D – Large-scale Preserve System |
|---|---|---|---|---|
| Covered Species: Golden-cheeked Warbler and Black-capped Vireo | Anticipated land development to result in GCW habitat loss of approximately 13% of Hays County habitat and less than 4% of habitat in Recovery Region 5. Adverse effects moderated by existing GCW preserves and individual ESA authorizations – overall **minor to moderate adverse impact to the GCW**.<br><br>Projected land use trends likely to result in only **negligible adverse and beneficial effects to the BCV**. Land development could be expected to generally have adverse effects, while other types of land uses (such that might convert forest to shrubland) could have beneficial effects. Any adverse effects could be moderated by individual ESA authorizations. | Potential adverse effects from land development activities similar to No Action. RHCP conservation program, including preserve acquisitions, preserve management, and public education program, to result in **moderate beneficial effect to GCW** in Hays County, compared to No Action.<br><br>Potential effects from land use trends similar to No Action. RHCP conservation program, including preserve acquisitions, preserve management, and public education program, to result in a **minor to moderate beneficial effect to BCV** in Hays County, compared to No Action. | Potential adverse effects from land development activities similar to No Action. Relatively small scale of alternative conservation program to result in **minor beneficial effect** to GCW in Hays County, compared to No Action.<br><br>Potential effects from land use trends similar to No Action. Relatively small scale of alternative conservation program to result in **negligible to minor beneficial effect to BCV** in Hays County, compared to No Action. | Potential adverse effects from land development activities similar to No Action. Large scale of the alternative conservation program to result in **moderate beneficial effect** to GCW in Hays County, compared to No Action.<br><br>Potential effects from land use trends similar to No Action. Large scale of alternative conservation program to result in **moderate beneficial effect to BCV**, compared to No Action. |

**Summary and Comparison of Environmental Effects for Alternatives.**

| | Alternative A – No Action | Alternative B – Proposed Hays County RHCP | Alternative C – Moderate Preserve/Limited Take | Alternative D – Large-scale Preserve System |
|---|---|---|---|---|
| Evaluation & Additional Species | Anticipated land development could result in **negligible to major adverse effects to unlisted evaluation species** (little is currently known about these species), and could be moderated by existing regulatory programs protecting aquifer recharge features and water quality.<br><br>Anticipated land development could result in **negligible to moderate adverse effects to additional species**, and could be moderated by existing regulatory programs and mitigation provided by individual ESA authorizations. | Potential adverse effects from land development activities similar to No Action. RHCP conservation program could result in **negligible to major beneficial effects for unlisted evaluation species** by incidentally protecting habitat for one or more evaluation species, increasing public awareness of karst issues, and funding research.<br><br>Potential adverse effects from land development activities similar to No Action. RHCP conservation program could result in **negligible to moderate beneficial effects for additional species** by incidentally protecting habitat for one or more additional species and increasing public awareness of water quality and endangered species issues. | Potential adverse effects from land development activities similar to No Action. Relatively small scale of alternative conservation program could result in **negligible to major beneficial effects for unlisted evaluation species** by incidentally protecting habitat for one or more evaluation species and increasing public awareness of karst issues.<br><br>Potential adverse effects from land development activities similar to No Action. Relatively small scale of alternative conservation program could result in **negligible to minor beneficial effects for additional species**. | Potential adverse effects from land development activities similar to No Action. Large scale of alternative conservation program could result in **minor to moderate beneficial** effects for unlisted evaluation species by incidentally protecting habitat for one or more evaluation species, increasing public awareness of karst issues, and funding research.<br><br>Potential adverse effects from land development activities similar to No Action. Large scale alternative conservation program could result in **minor to moderate beneficial effects for additional species**. |

**Summary and Comparison of Environmental Effects for Alternatives.**

| | Alternative A – No Action | Alternative B – Proposed Hays County RHCP | Alternative C – Moderate Preserve/Limited Take | Alternative D – Large-scale Preserve System |
|---|---|---|---|---|
| Other Special Status Species | Anticipated land development could result in **negligible to moderate adverse effects** to other listed species. Adverse effects would be moderated by individual ESA authorizations. | Potential adverse effects associated with increasing human population and land development would be similar to the No Action alternative. RHCP conservation program could result in **negligible to minor beneficial effects**, compared to No Action. | Potential adverse effects associated with increasing human population and land development would be similar to the No Action alternative. Alternative conservation program could result in **negligible beneficial effects**, compared to No Action. | Potential adverse effects associated with increasing human population and land development would be similar to the No Action alternative. Alternative conservation program could result in **negligible to minor beneficial effects**, compared to No Action. |
| Population, Employment & Economic Trends | No Action alternative is not likely to affect projected population, employment, or general economic trends in Hays County or region. | Implementation of RHCP would not be expected to affect overall population, employment, or general economic trends in Hays County or region. | Alternative C would not be expected to affect overall population, employment, or general economic trends in Hays County or region. | Alternative D would not be expected to affect overall population, employment, or general economic trends in Hays County or region. |
| Land Use & Housing Trends | Current land use trends and housing trends would be expected to continue under the No Action. | Implementation of RHCP would likely have only **minor beneficial impacts on housing and construction trends**, compared to the No Action alternative. Potential impacts to housing prices in Hays County would likely be negligible under the proposed RHCP, compared to the No Action alternative | Alternative C would likely have only **minor beneficial impacts on housing and construction trends**, compared to the No Action alternative. Potential impacts to housing prices in Hays County would likely be negligible. | Alternative D would likely have only **minor beneficial impacts on housing and construction trends**, compared to the No Action alternative. Potential impacts to housing prices in Hays County would likely be negligible. |

**Summary and Comparison of Environmental Effects for Alternatives.**

| | Alternative A – No Action | Alternative B – Proposed Hays County RHCP | Alternative C – Moderate Preserve/Limited Take | Alternative D – Large-scale Preserve System |
|---|---|---|---|---|
| Hays County Finances | County tax base would continue to grow as projected. County would need to find funding for ESA compliance on a case-by-case basis. | Implementation of RHCP would likely result in **negligible to minor beneficial effect on the use of voter-approved bond funds** compared to the No Action alternative. The use of general operations and maintenance funds for the RHCP could have an overall **minor adverse effect on County general fund services and programs.** Proposed RHCP could have a **minor beneficial effect on the County's tax base.** | Implementation of Alternative C alternative would have **negligible to minor beneficial effect on the use of existing bond funds**. Alternative C alternative would likely have a **minor adverse effect on County general fund services and programs**. Alternative C would likely have a **minor beneficial effect on the County tax base** compared to the No Action alternative | Implementation of Alternative D alternative would have **negligible to minor beneficial effect on the use of existing bond funds**. Alternative C alternative would likely have a **moderate adverse effect on County general fund services and programs**. Alternative C would likely have a **minor beneficial effect on the County tax base** compared to the No Action alternative |
| ESA Compliance Burden | Costs to landowners and project proponents related to ESA compliance under the No Action alternative could be substantial, resulting in an overall **moderate adverse impact**. | Under RHCP, time and cost savings could be expected for participants in the proposed RHCP and would likely represent a **moderate beneficial impact**. | Limited scope of Alternative C would only be expected to have a **minor beneficial effect** on easing the ESA compliance burden. | Expansive scope of Alternative D would likely result in a **moderately beneficial impact** for easing the ESA compliance burden. |

# 1.0 INTRODUCTION, PURPOSE, AND NEED

## 1.1 Introduction and Background

The purpose for which this EIS is being prepared is to: (1) Respond to Hays County's application for an incidental take permit for the proposed covered species (black-capped vireo and golden-cheeked warbler (related to activities that have the potential to result in take, pursuant to the ESA section 10(a)(1)(B) and its implementing regulations and policies; (2) Protect, conserve, and enhance the covered species and their habitat for the continuing benefit of the people of the United States; (3) Provide a means and take steps to conserve the ecosystems upon which the covered species depend; (4) Contribute to the long-term survival of covered species through protection and management of the species and their habitat; and (5) Facilitate compliance with the ESA, NEPA, and other applicable federal laws and regulations.

The need for the action is based on the potential that activities proposed within the limits of Hays County could result in take of covered species, thus prompting the need for an incidental take permit.

The County of Hays, Texas is applying for an incidental take permit under Section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (ESA) from U.S. Fish and Wildlife Service ("Service" or USFWS). The requested permit would authorize the incidental take of two endangered songbirds: the golden-cheeked warbler (*Dendroica chrysoparia*, GCW) and the black-capped vireo (*Vireo atricapilla*, BCV). These species are collectively referred to as the "covered species."

Proposed issuance of an incidental take permit by the Service is a Federal action subject to review under the National Environmental Policy Act of 1969 (NEPA). As part of the NEPA process, the Service prepared an Environmental Impact Statement (EIS) that analyzes the effects of issuing an incidental take permit to Hays County on the human environment.

To support its application for an incidental take permit, Hays County prepared a regional habitat conservation plan (the "Hays County RHCP") that covers a 30-year period from 2010 through 2039. The permit area for the RHCP is Hays County in central Texas (Figure 1-1). While the entire county would be covered by the proposed incidental take permit, potential habitat for the golden-cheeked warbler and black-capped vireo occurs in the portion of Hays County within the Edwards Plateau ecoregion, generally west of Interstate Highway 35. The area of potential effect for this EIS includes the full extent of Hays County, Texas.

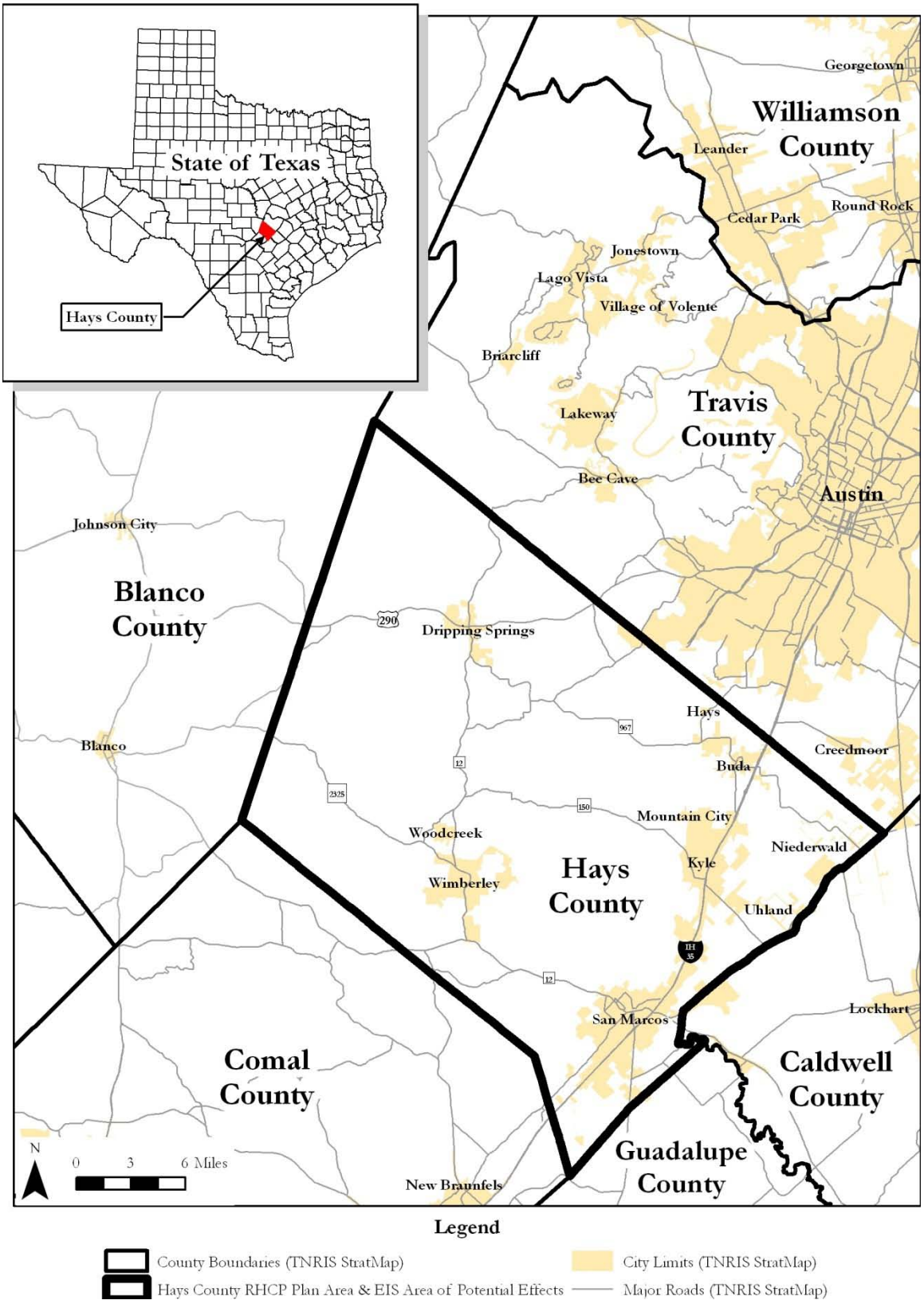
### 1.1.1 Hays County Background

Hays County is located in central Texas and covers approximately 434,335 acres (based on county boundaries provided by the Texas Natural Resources Information Service (TNRIS) Strategic Mapping Program (StratMap)). The western three-quarters of Hays County (generally

west of Interstate Highway 35) are within the Balcones Canyonlands portion of the Edwards Plateau ecoregion.

The habitats of the Edwards Plateau ecoregion support several federally listed species, including the golden-cheeked warbler and the black-capped vireo, and a number of other unlisted species that may be rare and/or particularly sensitive to habitat changes.

**Figure 1-1. Hays County RHCP Plan Area and EIS Area of Potential Effects**



Hays County is situated between the major population centers of Austin and San Antonio. The county is currently included in the Austin-Round Rock Metropolitan Statistical Area (MSA), and was the second fastest growing county in the MSA (which also includes Bastrop, Caldwell, Travis, and Williamson counties). Hays County experienced population growth of an estimated 64.7 percent between 1997 and 2007 (Real Estate Center at Texas A&M University (RECenter) 2008a). The population of Hays County is expected to increase from 97,589 in the year 2000 to an estimated 375,873 by the year 2040, which is a projected population increase of approximately 285 percent (TXP and Capitol Market Research 2008).

While Hays County is currently mostly rural, with agricultural land uses dominating the landscape, new land development is expected to accompany the projected population increase and is estimated to result in approximately 57,700 acres of land being converted from undeveloped land uses to developed land uses during the next 30 years (see Section 5.2 of the Hays County RHCP).

Land development activities and certain land management practices within Hays County have the potential to impact habitat for the golden-cheeked warbler and black-capped vireo, which could result in incidental take. The need for ESA compliance will likely increase as the population of Hays County, and associated land development activities, continues to grow. The RHCP is needed to help ensure that development and other types of land uses go forward in an efficient manner with consideration for the protection of rare species in Hays County.

### 1.1.2 Hays County Regional Habitat Conservation Plan

In support of the incidental take permit application, Hays County prepared a regional habitat conservation plan (the "Hays County RHCP") to establish a conservation program that would minimize and mitigate to the maximum extent practicable the impacts of incidental take of the covered species in Hays County that would be authorized by the permit.

In addition to the covered species, a number of other species are addressed in the Hays County RHCP that would not be authorized for incidental take (Table 1-1). Many of these species are not listed under the ESA. However, some may be rare and/or endemic to Hays County, and without adequate conservation measures, one or more of these species could become listed by the Service in the future.

**Table 1-1. Species Addressed in the Hays County RHCP.**

| Common Name | Scientific Name | Taxa | Habitat |
|---|---|---|---|
| | **COVERED SPECIES** | | |
| Golden-cheeked warbler** | *Dendroica chrysoparia* | Birds | Juniper-Oak Woodland |
| Black-capped vireo** | *Vireo atricapilla* | Birds | Deciduous Shrubland |
| | **EVALUATION SPECIES OF CONCERN** | | |
| Aquifer flatworm | *Sphalloplana mohri* | Turbellarians | Aquatic/Karst |
| Flattened cavesnail | *Phreatodrobia micra* | Mollusks | Aquatic/Karst |
| Disc cavesnail | *Phreatodrobia plana* | Mollusks | Aquatic/Karst |

**Table 1-1. Species Addressed in the Hays County RHCP.**

| Common Name | Scientific Name | Taxa | Habitat |
|---|---|---|---|
| High-hat cavesnail | *Phreatodrobia punctata* | Mollusks | Aquatic/Karst |
| Beaked cavesnail | *Phreatodrobia rotunda* | Mollusks | Aquatic/Karst |
| A cave-obligate leech | *Mooreobdella* n. sp. *** | Hirudinea | Aquatic/Karst |
| A cave-obligate crustacean | *Tethysbaena texana* | Crustaceans | Aquatic/Karst |
| A cave-obligate amphipod | *Allotexiweckelia hirsuta* | Crustaceans | Aquatic/Karst |
| A cave-obligate amphipod | *Artesia subterranea* | Crustaceans | Aquatic/Karst |
| A cave-obligate amphipod | *Holsingerius samacos* | Crustaceans | Aquatic/Karst |
| A cave-obligate amphipod | *Seborgia relicta* | Crustaceans | Aquatic/Karst |
| Balcones cave amphipod | *Stygobromus balconis* | Crustaceans | Aquatic/Karst |
| Ezell's cave amphipod | *Stygobromus flagellatus* | Crustaceans | Aquatic/Karst |
| A cave-obligate amphipod | *Texiweckelia texensis* | Crustaceans | Aquatic/Karst |
| A cave-obligate amphipod | *Texiweckeliopsis insolita* | Crustaceans | Aquatic/Karst |
| Texas troglobitic water slater | *Lirceolus smithii* | Crustaceans | Aquatic/Karst |
| A cave-obligate decapod | *Calathaemon holthuisi* | Crustaceans | Aquatic/Karst |
| Balcones cave shrimp | *Palaemonetes antrorum* | Crustaceans | Aquatic/Karst |
| A cave-obligate spider | *Cicurina ezelli* | Arachnids | Karst |
| A cave-obligate spider | *Cicurina russelli* | Arachnids | Karst |
| A cave-obligate spider | *Cicurina ubicki* | Arachnids | Karst |
| Undescribed cave-obligate spider | *Eidmannella* n. sp. | Arachnids | Karst |
| Undescribed cave-obligate spider | *Neoleptoneta* n. sp. 1 | Arachnids | Karst |
| Undescribed cave-obligate spider | *Neoleptoneta* n. sp. 2 | Arachnids | Karst |
| Undescribed cave-obligate spider | *Neoleptoneta* n. sp. eyeless | Arachnids | Karst |
| A pseudoscorpion | *Tartarocreagris grubbsi* | Arachnids | Karst |
| A cave-obligate harvestman | *Texella diplospina* | Arachnids | Karst |
| A cave-obligate harvestman | *Texella grubbsi* | Arachnids | Karst |
| A cave-obligate harvestman | *Texella mulaiki* | Arachnids | Karst |
| A cave-obligate harvestman | *Texella renkesae* | Arachnids | Karst |
| A cave-obligate springtail | *Arrhopalites texensis* | Hexapods | Karst |
| An ant-like litter beetle | *Batrisodes grubbsi* | Insects | Karst |
| Comal Springs diving beetle | *Comaldessus stygius* | Insects | Aquatic/Karst |
| Edwards Aquifer diving beetle | *Haideoporus texanus* | Insects | Aquatic/Karst |
| A cave-obligate beetle | *Rhadine austinica* | Insects | Karst |
| A cave-obligate beetle | *Rhadine insolita* | Insects | Karst |
| Undescribed beetle | *Rhadine* n. sp. (*subterranea* group) | Insects | Karst |
| Undescribed beetle | *Rhadine* n. sp. 2 (*subterranea* group) | Insects | Karst |
| Blanco River springs salamander | *Eurycea pterophila* | Amphibians | Aquatic/Karst |
| Blanco blind salamander | *Eurycea robusta* | Amphibians | Aquatic/Karst |
| **ADDITIONAL SPECIES OF CONCERN** | | | |
| Hill Country wild-mercury | *Argythamnia aphoroides* | Plants | Terrestrial |
| Warnock's coral-root | *Hexalectris warnockii* | Plants | Terrestrial |
| Canyon mock-orange | *Philadelphus ernestii* | Plants | Terrestrial |
| Texas wild-rice** | *Zizania texana* | Plants | Aquatic |
| Texas fatmucket | *Lampsilis bracteata* | Mollusks | Aquatic |
| Golden orb | *Quadrula aurea* | Mollusks | Aquatic |

**Table 1-1. Species Addressed in the Hays County RHCP.**

| Common Name | Scientific Name | Taxa | Habitat |
|---|---|---|---|
| Texas pimpleback | *Quadrula petrina* | Mollusks | Aquatic |
| Texas austrotinodes caddisfly | *Austrotinodes texensis* | Insects | Aquatic |
| Comal Springs riffle beetle** | *Heterelmis comalensis* | Insects | Aquatic/Karst |
| A mayfly | *Procloeon distinctum* | Insects | Aquatic |
| San Marcos saddle-case caddisfly | *Protoptila arca* | Insects | Aquatic |
| Comal Springs dryopid beetle** | *Stygoparnus comalensis* | Insects | Aquatic/Karst |
| Fountain darter** | *Etheostoma fonticola* | Fishes | Aquatic |
| San Marcos salamander* | *Eurycea nana* | Amphibians | Aquatic/Karst |
| Eurycea species (northern Hays County)* or ** | *Eurycea* species | Amphibians | Aquatic/Karst |
| Texas blind salamander** | *Eurycea rathbuni* | Amphibians | Aquatic/Karst |

* Federally threatened species

** Federally endangered species

*** The designation "n. sp." indicates a "new species" within a genus that has not yet been assigned a species name by acknowledged experts.

Development of the Hays County RHCP was funded by a combination of Federal grant dollars, local funding, and County staff services. The Hays County Commissioners' Court approved an application to the Service for a habitat conservation planning grant in April 2005. The Service responded favorably to the County's grant application, awarding $753,750 to the County to develop a plan. The Federal award required a non-Federal match of $251,250, which the County provided through in-kind services. The Texas Parks and Wildlife Department (TPWD) administered the grant for the Service and negotiated an interlocal agreement with Hays County to disburse the funds in May 2006.

The grant application defined the initial scope of the Hays County RHCP, which included a focus on the golden-cheeked warbler, but allowed for the consideration of the black-capped vireo and other species in the plan. Detailed guidance on the scope of the Hays County RHCP was provided by the Citizens Advisory Committee (CAC) and the Biological Advisory Team (BAT). The CAC provided input on the preferred conservation strategy, including stakeholder preferences for preserve system size, acquisition mechanisms, and funding. The BAT recommended a list of species to address in the plan, including the species that should be considered for incidental take authorization, and provided other biological guidance.

Other guidance for the Hays County RHCP was provided by the Hays County Commissioners' Court, County staff, the Service, and public comments.

## 1.2 Purpose and Need for Action

The Proposed Action is issuance of an ESA Section 10(a)(1)(B) incidental take permit by the Service that would authorize to incidentally take the covered species associated with otherwise lawful land use activities in Hays County within the context of the Hays County RHCP. Issuance of the permit would also allow Hays County to extend this authorization to

other non-Federal entities for impacts to the covered species within the county. The Proposed Action has both ecological and socioeconomic purposes.

The primary ecological purposes of the Proposed Action are to: 1) support populations of the covered species in Hays County by protecting and managing habitat for these species in perpetuity; 2) contribute to and facilitate the recovery of the covered species in Hays County; 3) assist the Service in conserving 40 rare, but currently unlisted, karst species found in Hays County (these species are addressed in the RHCP as "evaluation species"); and 4) contribute to the conservation of the 16 other federally listed and unlisted species that are addressed in the RHCP as "additional species."

The conservation actions described in the Hays County RHCP are expected to provide a comprehensive and coordinated strategy for the conservation of rare species throughout Hays County. The RHCP would contribute to the species' long-term survival, while allowing otherwise lawful development to occur through a voluntary alternative to individual project authorizations from the Service.

The socioeconomic purpose of the Proposed Action is to allow the proponents of otherwise lawful activities to comply with the ESA in a more efficient, effective, and coordinated manner than might occur through individual project approvals. The Hays County RHCP would also help to ensure that development goes forward in a manner that is consistent with the protection of rare species.

As the population of Hays County continues to grow, the need for ESA compliance by public and private entities will likely increase. The urgency for addressing habitat and species protection in an organized and predictable manner is underscored by the high rate of growth projected for Hays County.

The need for the Proposed Action is based on an expected increase in population with associated land development activities and other land use changes in Hays County that have the potential to result in take of the covered species that either does not comply with the ESA or complies in a less efficient, less coordinated manner than is possible without the Hays County RHCP.

## 1.3 Regulatory Framework

### 1.3.1 Endangered Species Act

The ESA is intended to protect and conserve species listed as threatened or endangered and to conserve the habitats upon which they depend. Furthermore, the ESA mandates that all Federal agencies seek to conserve endangered and threatened species and use their resources and authorities to further such purposes.

Section 9 of the ESA prohibits "take" of any federally listed wildlife species (16 United States Code "USC" § 1538(a)). Take, as defined by the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC § 1532(19)). Harm is defined in the Service's regulations as an act that actually kills or injures wildlife and may include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, and sheltering" (50 Code of Federal Regulations). Harass is further defined as an act or omission which crates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited breeding, feeding, or sheltering" (50 Code of Federal Regulations (CFR § 17.3).

If it is not practicable for a non-Federal entity to design an otherwise lawful land use activity so as to avoid take of a listed species, Section 10(a)(1)(B) of the ESA (16 USC §1539(a)(1)(B)), authorizes the Service to issue an incidental take permit for non-Federal projects or activities not requiring Federal authorization or funding. The permit allows for impacts to the covered species, provided certain conditions are satisfied. These conditions include the preparation of a habitat conservation plan (HCP) outlining the measures that the permittee will undertake to minimize and mitigate "to the maximum extent practicable" the impacts of the taking of the species (ESA (10)(a)(2)(A)).

In addition to the ESA and its implementing regulations, the Service's Habitat Conservation Planning and Incidental Take Permit Processing Handbook (HCP Handbook)(1996) provides overall guidance on the elements of an HCP (USFWS and National Marine Fisheries Service (NMFS) 1996).

Section 7(a)(2) of the ESA requires all Federal agencies, in consultation with the Service, to ensure that any action "authorized, funded, or carried out" by that agency is "not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification" of critical habitat. The Service's issuance of an incidental take permit is an action subject to the provisions of Section 7 the ESA and therefore the Service must consult with itself to determine whether issuance of the proposed incidental take permit will jeopardize the continued existence of the listed species to be taken or result in the adverse modification of those species' critical habitats. Section 7 requires, among other things, an analysis of indirect effects to the listed species at issue, effects on other listed species, including federally listed plants, and effects on critical habitat. The results of the Section 7 consultation are documented in a Biological Opinion prepared by the Service, including the conclusions regarding the likelihood of the issuance of the permit to jeopardize the continued existence of, or destruction or adverse modification of designated critical habitat for any listed species. The intra-service Section 7 consultation must be concluded prior to the issuance of the incidental take permit.

#### 1.3.1.1 Concepts and Benefits of Regional HCPs

Although the ESA does not specifically mention regional HCPs, the HCP Handbook discusses the regional HCP concept. In contrast to individual HCPs, a regional HCP often covers a larger geographic area, numerous landowners, and multiple species. Local or regional governmental entities are often the applicant/permittee, and they commit to implement the conservation program contained in the plan. As stated on page 1-15 of the HCP Handbook, the Service encourages, as one of its "guiding principles," State and local governments and private landowners to undertake regional and multi-species HCPs.

In addition to providing a participatory process for ESA compliance that may be less burdensome for individual landowners, the HCP Handbook describes several other advantages of regional and multi-species HCPs, each of which appears to be applicable to the proposed Hays County RHCP:

1. Maximize flexibility and available options in developing mitigation programs. Individual projects often face limited options when developing mitigation proposals because of individual applicants' limited financial resources or the lack of suitable habitat available for mitigation. The regional HCP approach leads to conservation of less fragmented tracts of habitat that are better for the species and applicants. The regional HCP administrative entity enjoys improved mitigation "buying power" and can pool participant payments to acquire high quality, contiguous tracts for conservation.
2. Reduce the economic and logistic burden of these programs on individual landowners by distributing their impacts. The regional HCP approach introduces an economy of scale in terms of the basic logistical functions by establishing region-wide criteria for participation and consolidating many of the ministerial and other HCP processing steps into one permitting process.
3. Reduce uncoordinated decision making, which can result in incremental habitat loss and inefficient project review. The regional HCP approach allows the applicant and the Service to develop standardized criteria for participants, making it easier to ensure that similarly-situated projects are treated similarly in terms of mitigation requirements.
4. Provide the permittee with long-term planning assurances and increase the number of species for which such assurances can be given. The regulatory certainty that would result from issuance of the Permit could reduce the legal and financial risks associated with public and private development and infrastructure planning. The Hays County RHCP is expected to lead to long-term benefits for the covered species and potentially contribute to their recovery.

5. Bring a broad range of activities under the Permit's legal protection. Because the Permit could cover most types of public and private land use and development activities in Hays County, it could contribute substantially to overall efficiency in executing proposed projects and ensure that mitigation requirements for species impacts are determined using consistent criteria.

6. Reduce the regulatory burden of Endangered Species Act compliance for all affected participants. The RHCP would make it possible for each project that voluntarily conforms to the RHCP to obtain ESA authorization through a streamlined, efficient process, potentially at much less cost than obtaining incidental take authorization under individual section 10(a)(1)(B) permits and section 7(a)(2) consultations (USFWS and NMFS 1996).

In addition to these benefits, the RHCP would also facilitate acquisition of Federal grants by the County through the Service's ESA Section 6 Habitat Conservation Plan Land Acquisition Program. Land acquired with Habitat Conservation Plan Land Acquisition Program funds cannot be used as mitigation in an HCP, but may be used to complement an approved HCP to further assist conservation of federally listed species.

### 1.3.2 National Environmental Policy Act

The issuance of a Section 10(a)(1)(B) incidental take permit is a Federal action and is therefore subject to NEPA (42 USC 4321 et seq.). NEPA requires that Federal agencies consider all reasonably foreseeable environmental effects of their proposed actions on the human environment. NEPA also requires that the Federal action agency involve and inform the public in the decision-making process; although NEPA does not mandate a specific outcome. NEPA also established the Council on Environmental Quality (CEQ) in the Executive Office of the President to formulate and recommend national policies that ensure that the programs of the Federal government promote improvement of the quality of the environment. The CEQ set forth regulations (40 CFR 1500-1508) to assist Federal agencies in implementing NEPA during the planning phases of any Federal action. These regulations, together with specific Federal agency NEPA implementation procedures, help ensure that the environmental impacts of any proposed decisions are fully considered.

While similar in some respects, the scope of NEPA goes beyond that of the ESA. NEPA analyses must consider the impacts of a Federal action not only on fish and wildlife resources, but also on non-wildlife resources of the human environment, such as water quality, cultural resources, and socioeconomic values.

With respect to HCPs in general, compliance with NEPA is not a direct obligation or requirement of the applicant for the incidental take permit. However, the Service must comply with NEPA when making its decision on the application and implementing the Federal action of

issuing a permit. Consequently, the appropriate environmental analyses must be conducted and documented before an incidental take permit can be issued.

The Service has determined that an Environmental Impact Statement (EIS) is appropriate for this proposed action.

### 1.3.3 Texas State Law Relevant to Regional HCPs

Texas state law restricts a local government's role in developing, adopting, approving, or participating in a regional HCP (Chapter 83 of the Texas Parks and Wildlife Code). Among other things, state law requires the governmental entity participating in a regional HCP to establish a Citizens Advisory Committee, appoint a Biological Advisory Team, comply with open records/open meetings laws, comply with public hearing requirements, provide a grievance process to Citizens Advisory Committee members, and acquire preserves by specific deadlines.

Under Chapter 83 of the Texas Parks and Wildlife Code, governmental entities participating in a regional HCP are prohibited from:

- Imposing any sort of regulation related to endangered species (other than regulations involving groundwater withdrawal) unless that regulation is necessary to implement a regional HCP for which the governmental entity was issued a Federal permit (Texas Parks and Wildlife Code § 83.014(a)).
- Discriminating against a permit application, permit approval, or request for utility service to land that has been designated a habitat preserve for a regional HCP (Texas Parks and Wildlife Code § 83.014(b)).
- Limiting water or wastewater service to land that has been designated as habitat preserve (Texas Parks and Wildlife Code § 83.014(c)).
- Requiring a landowner to pay a mitigation fee or set aside, lease, or convey land as habitat preserve as a condition to the issuance of a permit, approval or service (Texas Parks and Wildlife Code § 83.014(d)).

In addition to the above prohibitions, Chapter 83 stipulates that the mitigation included in a regional HCP, including any participation fee and the size of habitat preserves, must be based on the amount of harm to each endangered species that the plan will protect. However, after notice and hearing, a regional HCP (including the mitigation fees and size of any proposed preserves) may be based partially upon recovery criteria applicable to the listed species covered by the regional HCP (Texas Parks and Wildlife Code § 83.105).

Chapter 83 also stipulates that governmental entities participating in a regional HCP demonstrate that adequate sources of funding exist to acquire the land for designated habitat preserves within four years of the date of permit issuance or within six years from the date of initial application, or the voters must have authorized bonds or other financing in an amount equal to the estimated cost of acquiring all of the land needed for habitat preserves within that

time frame (Texas Parks and Wildlife Code § 83.013). The deadline is calculated from the time a particular parcel is designated as proposed habitat preserve, a provision that may allow governmental entities flexibility to acquire preserves on a phased basis as the plan is implemented.

Finally, state law imposes a requirement that before adopting a regional HCP, plan amendment, ordinance, budget, fee schedule, rule, regulation, or order with respect to a regional HCP, the plan participant must hold a public hearing and publish notice of such hearing in the newspaper of largest general circulation in the county in which the participant proposes the action. Such notice must include a brief description of the proposed action and the time and place of a public hearing on the proposed action. The plan participant must publish notice in accordance with the foregoing requirements, and must do so not later than the thirtieth day prior to the public hearing (Texas Parks and Wildlife Code § 83.019).

## 1.4 Decision Needed

Based upon a biological and environmental analysis, the Service will determine whether to issue an ESA Section 10(a)(1)(B) incidental take permit to Hays County authorizing take of the covered species and the implementation of the Hays County RHCP.

# 2.0 SCOPING AND PUBLIC PARTICIPATION

"Scoping" is the process conducted by the agency preparing an EIS to identify the range of actions, alternatives, and impacts to be considered in the EIS as required by NEPA (40 CFR 1508.25).

NEPA requires a specific process for scoping that usually includes notice in the Federal Register, a public scoping meeting, and a public comment period. In addition to the formal scoping process, Hays County sought other types of public participation to provide guidance on the development of the RHCP, including the formation of advisory committees and the creation of a project website to distribute information to interested parties.

## 2.1 Public Scoping

### 2.1.1 Formal Scoping Process

Formal scoping for this EIS began on May 16, 2008 with the publication of a Notice of Intent (NOI) to prepare the EIS in the Federal Register (Appendix A). The NOI described the proposed Federal action (i.e., issuance of an incidental take permit for the Hays County RHCP) and the purpose and need for the action. The NOI also announced a public scoping meeting that was held on June 18, 2008 in San Marcos, Texas. In addition to the Federal Register notice, notices of the public scoping meeting were published in area newspapers, including *The Daily Record*, San Marcos, Texas (June 4, 2008) and the *Hays County Free Press*, Kyle, Texas (June 4, 2008) (Appendix A). These public notices were an invitation to the general public to become involved in the scoping process for the EIS.

The NOI and the media notices informed the public of the scoping meeting date and location, solicited written comments on the scope of the EIS, and provided contact information for Service and County personnel associated with the RHCP. The information was also posted on the Hays County RHCP website and notification was sent to local, State, and Federal elected and public officials and agencies in the surrounding areas. The mailing list and a copy of the scoping letter are included in Appendix A. Notification of the public scoping meeting and the opening of the public comment period for scoping comments were also sent to interested individuals subscribed to the RHCP's email list.

Six members of the public attended the public scoping meeting, which consisted of an Open House followed by a brief welcome and overview of the NEPA process and scoping by the Service. Handouts and exhibits were also available to attendees during the meeting (Appendix A). The public was given the opportunity to make comments on the scope of the EIS and a court reporter was available to record verbal comments. In addition to verbal comments, comment forms were provided to attendees and collected during the meeting.

Contact information for the Service was provided to allow attendees to submit written comments via regular mail after the meeting.

The official scoping comment period for the EIS was open from May 16, 2008 to July 18, 2008.

### 2.1.2 Public Scoping Comments and Responses

The Service received four comments from the public during the public scoping meeting: one verbal comment transcribed by a court reporter and three written comments submitted during the scoping meeting. Copies of the comments from the public scoping meeting are included in Appendix A. No other comments were received by the Service. The issues raised by the public during the EIS scoping period are summarized below, along with the responses from the Service and the County's RHCP project team.

1) "I'm the city engineer for the City of Dripping Springs. And the -- some of the questions we had, or the comments, was like, we'd just like to know basic things like what is the role of the city and its citizens. What role do we have in compliance? And -- you know, what are the expectations for the city during this conservation plan process And those are just basic questions, because we're not here to represent the council. They don't have any like -- you know, any special interests. We're just here to kind of find out and report back to them. So those are just basic questions that I would put on my comment card." *Rick Coneway, P.O. Box 384, Dripping Springs, Texas 78620*

   Response:

   As the Hays County RHCP is currently conceived, municipalities within Hays County will have no specific obligations under the RHCP. However, the County envisions active collaboration with municipalities in the balance of the RHCP development process and in a number of respects after plan adoption. For example, municipalities may direct participants in the plan to gain authorization for building or infrastructure projects that could harm covered species. In addition, the municipalities can play an important role in helping to educate the public and developers about species issues and the availability of the RHCP. There may also be circumstances in which the County, a municipality, and other stakeholders may cooperate in the establishment and maintenance of preserves under the RHCP. This would, of course, be accomplished through the execution of one or more appropriate interlocal agreements. County consultants are also available to make presentations to municipal governing and planning bodies regarding the RHCP and how it may benefit the municipalities.

2) "I believe that the Hays County HCP consultants, citizen's advisory committee, and biological advisory team have thought of pretty much every issue that needed to be considered in the HCP. I am especially interested in being sure that our aquatic resources, recharge zone areas, and aquatic endangered species are protected in this HCP process for

the golden cheeks & black caps. Or at least, not harmed. I hope the HCP will help us move quickly to conserve land to protect our hill country in our county." *Dianne Wassenich, 11 Tanglewood, San Marcos, Texas 78666*

Response:

Comment noted.

3) "I support the development and implementation of a Hays County HCP to protect not only endangered bird species but aquatic species and plants." *Commenter did not identify.*

Response**:**

Comment noted.

4) "The alternative of large-scale conservation is the best & strongest for the county. I support the idea of partnering with Comal County to strengthen the HCP. The drive toward parcel identification should simultaneously look at larger, cheaper tracts further out in the county as well as looking at more expensive, but valuable tracts that will soon be developed. Big picture & vision is important in setting the strategy." *Commenter did not identify.*

Response**:**

Comment noted.

### 2.1.3 Public Hearing Comments and Responses

The final draft RHCP and the accompanying Draft Environmental Impact Statement (DEIS) were noticed for availability in the Federal Register on November 2, 2009. A public hearing on the draft documents was held in San Marcos on November 18, 2009, and the public comment period closed on February 1, 2010. The Service granted an extension to the comment period to the Environmental Protection Agency, which closed on February 11, 2010.

Three sets of comments on the RHCP were received from the public. No comments on the RHCP or the DEIS were received from government agencies. Below is a summary of the comments received and a response to each.

**COMMENTER: James Buratti (1901 Uhland Road, San Marcos, TX 78666)**
SUBMITTED: November 17, 2009 via written comment collected at the public hearing

COMMENT SUMMARY: Commenter is concerned about restrictions on public access to conservation lands, and believes that the plan calls for a "de facto ban" on public access to preserves. Commenter asserts that the variety of recreational activities listed as examples of "active uses" have not been shown to be harmful to the endangered species and habitats protected by the plan, and refers to Stake (2000) as evidence that bicycles in golden-cheeked warbler habitat do not impact breeding or nesting success of the species. Commenter suggests that hiking, biking, and equestrian trails can be built to avoid impacts to water quality and habitat, and suggests that seasonal access restrictions would minimize or eliminate impacts to the

golden-cheeked warbler and black-capped vireo. Commenter questions whether aquatic recreational activities would also be banned in preserves.

COMMENT RESPONSE: The RHCP provides for public access to preserves on a case-by-case basis, at the consent of the preserve owner and with prior approval by the USFWS. An approved land management plan that addresses public access and baseline species and habitat monitoring surveys (including a territory mapping survey, a habitat occupancy survey, and a habitat survey) must also be completed prior to any public access of RHCP preserves. The RHCP also provides that some active uses of the preserve system may be allowed (again, on a case-by-case basis with USFWS approval) if impacts to the species are appropriately mitigated. Further, given the distribution of habitat for the golden-cheeked warbler and black-capped vireo across the landscape in Hays County, it is likely that preserves will include some areas that may not currently be suitable habitat for the covered species. These areas may create good opportunities for incorporating public access to preserves. Hays County, preserve parcel owners, and the USFWS will continue to coordinate during RHCP implementation to seek opportunities for public access of preserve lands that do not negatively affect the conservation value of the preserves for the covered species.

**COMMENTER: Andrew Hawkins, Save Our Springs Alliance**
SUBMITTED: November 18, 2009 via oral comment collected at the public hearing and recorded in the meeting transcript

COMMENT SUMMARY: Commenter is concerned that Hays County will have little discretion under the RHCP to refuse participation for certain projects. Commenter notes that the County should have the discretion to refuse participation by "bad developments" that might be able to meet the required mitigation ratios, but that would have undesirable effects on the community, aquatic species not covered by the RHCP, or other unforeseen effects. Commenter suggests that the County should be able to base mitigation requirements on factors such as important habitat for non-covered species and water quality concerns, in addition to impacts to the covered species.

COMMENT RESPONSE: The RHCP currently gives Hays County the discretion to modify the participation process in a variety of ways to enable the County to achieve the goals and objectives of the RHCP, including the discretion to deny participation in the plan (see Section 7.4.5), to adjust the mitigation ratios required for participation in the plan (see Section 7.4.4), and to adjust the per credit fee charged to plan participants (see Section 7.4.7.1). These discretionary provisions will give the County the flexibility to fine-tune participation in the RHCP and adapt to future circumstances. It is important to note that participation in the plan is the primary factor that will drive the need for and funding/implementation of the beneficial conservation actions described in the RHCP. The purpose of the RHCP is to provide for a streamlined method of achieving compliance with the Endangered Species Act for otherwise lawful activities, but participation in the plan by the community is voluntary. Therefore, robust participation will be needed for the plan to achieve the goal of protecting 10,000 to 15,000 acres of endangered species habitat in Hays County. Finally, Chapter 83 of the Texas Parks and Wildlife Code requires that mitigation fees required of RHCP participants be based on the amount of harm to

the endangered species protected by the plan (in this case, the golden-cheeked warbler and black-capped vireo) and does not allow the County to use the RHCP to require mitigation for other species or natural resources (see Section 83.015 of Chapter 83 of the Texas Parks and Wildlife Code).

**COMMENTER: Bill Bunch, Save Our Springs Alliance**
SUBMITTED: February 1, 2010 via email to info@hayscountyhcp.com

COMMENT SUMMARY: Commenter urges reconsideration of prior comments submitted by Save Our Springs Alliance on RHCP drafts and emphasizes that Hays County's discretionary authority to deny participation in the RHCP is too narrow. Commenter suggests that replacing the text for "not conform with the goals *and* provisions of the RHCP" to "not conform with the goals *or* provisions of the RHCP" [emphasis added]. Commenter also suggests adding that participation may also be denied if doing so "is important to protecting wildlife habitat, aquifer recharge, water quality, or meeting other community goals, including but not limited to managing traffic, or protecting historic or natural or cultural heritage resources."

COMMENT RESPONSE: We have made the requested revision regarding changing "and" to "or" when describing the County's discretion to deny participation in the RHCP. When describing this discretion in Section 7.4.5, we have also highlighted the protection of habitats for the covered species as one of the goals of the RHCP. Please see the response to the earlier comment addressing discretionary authority.

## 2.2 Other Public and Stakeholder Involvement

### 2.2.1 Stakeholder and Technical Advisory Committees

In addition to the public scoping process, Hays County also instituted two advisory committees: the Citizens Advisory Committee (CAC) and the Biological Advisory Team (BAT).

#### 2.2.1.1 Citizens Advisory Committee

The CAC was composed of 17 individuals appointed by the Hays County Commissioners' Court in accordance with state law (Texas Parks and Wildlife Code Chapter 83).

Appointed CAC members included:

Hays County Landowners

- Ms. Catherine Livingston
- Mr. Henry Brooks
- Mr. Chris Carson
- Mr. William Avera
- Mr. T.J. Higginbotham - CAC Assistant Chairperson
- Mr. Scott Johnson

Real Estate, Land Development, and Other Business Interests

- Mr. Chuck Lemmond (homebuilder)
- Mr. Jeff Wilkinson (Pioneer Community Bank)

- Mr. David Goodrum (Wilson Family Communities)

Government and Utilities

- Ms. Melanie Pavlas Snyder (Lower Colorado River Authority)
- Dr. Todd Voetler (Guadalupe-Blanco River Authority)
- Dr. Glenn Longley (Texas State University)

Conservation and Environmental Groups and Individuals

- Ms. Melinda Mallia - CAC Chairperson
- Ms. Melanie Howard (City of San Marcos Parks and Recreation Department)
- Ms. Dianne Wassenich (San Marcos River Foundation)
- Mr. David Baker (Wimberley Valley Watershed Association)

Texas Parks and Wildlife Department

- Ms. Kathy Boydston

CAC meetings were posted and open to the public, as directed under the Texas Open Meetings Act, and all work products of the CAC, as well as information presented at the CAC meetings were available to the public in accordance with the Texas Open Records Act. Meeting notices were announced to interested individuals subscribed to the RHCP's email list, and agendas, minutes, and other materials were posted on the Hays County RHCP website. Members of the CAC met eight times prior to the June 2008 public scoping meeting (Table 2-1).

**Table 2-1. Hays County RHCP CAC Meetings.**

| Meeting Date | Key Issues Discussed[1] |
|---|---|
| July 5, 2007 | ▪ Hays County natural resources<br>▪ Report on the Endangered Species Act<br>▪ Report on the Hays County RHCP Work Plan<br>▪ BAT appointments<br>▪ Adoption of protocol for citizens' comments |
| September 13, 2007 | ▪ Selection of CAC Chair and Co-Chair<br>▪ Appointment of CAC representative to the BAT<br>▪ Legal requirements of RHCPs in Texas and the primary provisions of other RHCPs<br>▪ Baseline study of sensitive natural resources and species in Hays County |
| October 11, 2007 | ▪ Presentation regarding Edwards Aquifer Recovery Implementation Program and the Balcones Canyonlands Conservation Plan<br>▪ Draft Hays County RHCP outline<br>▪ Options for species to include in the RHCP<br>▪ Options for Hays County RHCP development |

**Table 2-1. Hays County RHCP CAC Meetings.**

| Meeting Date | Key Issues Discussed[1] |
|---|---|
| November 8, 2007 | ▪ Conceptual options for the Hays County RHCP<br>▪ Species coverage under the Hays County RHCP<br>▪ Draft Hays County RHCP outline |
| January 10, 2008 | ▪ Species coverage under the Hays County RHCP<br>▪ Presentation regarding Williamson County RHCP<br>▪ Conceptual options, potential cost, and possible funding mechanisms |
| February 20, 2008 | ▪ Status of Hays County Parks and Open Space Bond, Hays County Citizens Park Advisory Team, Hays County's Memorandum of Agreement with the Trust for Public Land, and possible coordination with the RHCP effort<br>▪ Hays County RHCP completion, anticipated tasks, and necessary CAC input<br>▪ Possible Hays County RHCP scenarios and potential cost |
| March 27, 2008 | ▪ Updated information on the San Marcos salamander<br>▪ Presentation regarding golden-cheeked warbler and black-capped vireo habitat<br>▪ Possible Hays County RHCP scenarios and conservation strategy |
| June 12, 2008 | ▪ Presentation regarding the Parks and Open Space Bond allocation process<br>▪ Hays County RHCP funding<br>▪ Draft Hays County RHCP |
| September 11, 2008 | ▪ Proposed RHCP funding measures and options<br>▪ Comments submitted on the draft RHCP<br>▪ Concerns regarding treatment of aquatic species in the RHCP |
| October 9, 2008 | ▪ Proposed RHCP funding measures<br>▪ Proposed RHCP mitigation ratios and preserve design criteria<br>▪ Treatment of aquatic species in the RHCP |
| November 13, 2008 | ▪ Presentation regarding Ashe juniper and water resources<br>▪ Recommendation for approval of draft RHCP for submittal |

[1]Minutes for all meetings can be found on the Hays County RHCP website at www.hayscountyhcp.com/team_cac.

#### 2.2.1.2 Biological Advisory Team

The BAT was composed of six individuals appointed by the Hays County Commissioners Court, including one individual put forth by the landowner members of the CAC. The BAT also included a chairperson who was appointed by the Texas Parks and Wildlife Commission.

BAT members included:

- Dr. Craig Farquhar, Texas Parks and Wildlife Department (expertise in avian ecology) – BAT Chairperson
- Mr. Lee Elliott, The Nature Conservancy (expertise in endangered species and conservation biology)
- Mr. Randy Gibson, USFWS National Fish Hatchery and Technology Center in San Marcos (expertise in aquatic resources)
- Mr. Cal Newnam, Texas Department of Transportation (expertise in endangered species biology)
- Ms. Terri Siegenthaler, Shield Ranch (expertise in natural resource management)
- Mr. Garry Stephens, USDA Natural Resources Conservation Service (expertise in land management)
- Ms. Linda Laack, Environmental Defense Fund (CAC landowner member appointee)

The BAT was charged to assist Hays County with the calculation of harm to the endangered species and the sizing and configuring of the habitat preserves, in accordance with state law (Texas Parks and Wildlife Code Chapter 83). BAT meetings were open to the public as directed under the Texas Open Meetings Act., and all work products of the BAT were available to the public under the Texas Open Records Act. Meeting notices were announced to interested individuals subscribed to the RHCP's email list, and agendas, minutes, and other materials were posted on the Hays County RHCP website. Members of the BAT met seven times prior to the June 2008 public scoping meeting (Table 2-2).

**Table 2-2. Hays County RHCP BAT Meetings.**

| Meeting Date | Key Issues Discussed[1] |
|---|---|
| October 9, 2007 | ▪ BAT responsibilities<br>▪ Hays County RHCP Work Plan<br>▪ ESA Requirements, Texas law requirements, and primary provisions of other RHCP's<br>▪ Presentation on the baseline study of sensitive natural resources and species in Hays County |

**Table 2-2. Hays County RHCP BAT Meetings.**

| Meeting Date | Key Issues Discussed[1] |
|---|---|
| November 1, 2007 | ▪ Briefing on species covered by the Balcones Canyonlands Conservation Plan<br>▪ Assessment and consideration of options for species coverage in the Hays County RHCP<br>▪ Briefing on habitat identification for the golden-cheeked warbler, black-capped vireo, and karst invertebrates |
| December 6, 2007 | ▪ Briefing on habitat identification for the golden-cheeked warbler, black-capped vireo, and karst invertebrates<br>▪ Assessment and consideration of options for species coverage in the Hays County RHCP |
| January 8, 2008 | ▪ Edwards Aquifer Recovery Implementation Program<br>▪ Assessment and consideration of options for species coverage in the Hays County RHCP<br>▪ Biological consideration for species protection and preserve design<br>▪ Progress of the Hays County RHCP planning process and decision points |
| February 28, 2008 | ▪ Options for species coverage in the Hays County RHCP<br>▪ Presentation regarding the Hays County RHCP alternatives<br>▪ Progress on habitat maps and proposed habitat determination process<br>▪ Preserve design criteria |
| March 28, 2008 | ▪ Options for species coverage in the Hays County RHCP<br>▪ Progress on habitat maps and proposed habitat determination process<br>▪ Preserve design criteria |
| June 3, 2008 | ▪ Options for species coverage in the Hays County RHCP<br>▪ Golden-cheeked warbler habitat map<br>▪ Draft Hays County RHCP |
| September 16, 2008 | ▪ Discussion regarding Ashe juniper and water resources<br>▪ Review habitat mapping efforts<br>▪ Review comments on draft RHCP |
| November 18, 2008 | ▪ Review comments on draft RHCP<br>▪ Discuss habitat assessment criteria and mitigation ratios<br>▪ Recommend approval of the draft RHCP for submittal |

[1]Minutes for all meetings can be found on the Hays County RHCP website at www.hayscountyhcp.com/team_bat.

### 2.2.2 Hays County RHCP Website

Throughout the development of the Hays County RHCP, a website was maintained to offer more opportunities to keep the public and interested stakeholders informed of the process and progress of the project (www.hayscountyhcp.com). The website served as a repository for information on the time and location of CAC and BAT meetings, the status of the project (including the RHCP work plan and progress reports), maps and documents supporting the RHCP, agendas and minutes of CAC and BAT meetings, project team information, and contact information. The website also served as a vehicle for interested persons to send comments, to ask questions, and to join an email list regarding the RHCP.

## 2.3 Alternatives Development

Federal regulations require that we examine all reasonable alternatives to the proposed action that the applicant considered, including "no action" (40 CFR 1502.14). The No Action analysis is needed to provide a benchmark against which the environmental effects of the "action" alternatives can be measured. Reasonable action alternatives include those that are practical or feasible to implement from a technical and economic perspective, or that may be considered reasonable based on "common sense" (per CEQ's "NEPA's Forty Most-Asked Questions," published with the Service's NEPA Reference Handbook).

There are no rules that dictate the precise method of mitigation that must be included in an HCP. The Service has approved various approaches to mitigation developed in regional HCPs in response to particular circumstances. Rather than require a certain approach, the Service's HCP Handbook states generally that mitigation programs should be based on sound biological principles and must be "commensurate with the impacts they address" (USFWS and NMFS 1996).

The alternatives considered during development of the proposed Hays County RHCP and preparation of this EIS were initially identified from a review of other regional HCP models used in Texas and elsewhere across the country. These models include three general approaches for mitigating impacts to covered species: pre-determined preserves, conservation banks, and regulatory programs.

Under the pre-determined preserve design model, the regional HCP would identify and delineate a "target area" for preserve acquisition. Within this pre-determined target area, the applicant would agree to acquire or otherwise protect a certain amount of habitat for the species covered by the plan. Development would be allowed outside the designated target preserve area through participation in the regional HCP or through individual ESA authorizations. Projects on land within the target preserve area would not be allowed to participate in the regional HCP, but could seek individual ESA authorizations through the Service. This type of plan is premised on protecting an appropriate amount of high-quality habitat up-front, such that the impacts of development in the remainder of the permit area (up to the limit of authorized incidental take)

would be adequately minimized and mitigated and the continued existence of the species would not be jeopardized. The Balcones Canyonlands Conservation Plan in Travis County, Texas and the Riverside County and San Diego Multispecies Conservation Plans in California are examples of regional HCPs based on this model.

In contrast, a conservation banking model for a regional HCP does not designate a "target area" for preserve acquisition. Instead, the applicant would preserve, through a series of transactions over time, parcels of high quality habitat for the covered species within the permit area and receive "credits" from the Service that could be "banked" for future use or sale to other entities. The applicant would coordinate with the Service to determine the appropriate method for establishing the number of credits that would be associated with each parcel protected through the bank. In addition, the applicant would coordinate with the Service to develop a habitat assessment process to determine the number of credits that would be required for a participating entity to adequately mitigate for impacts to the covered species from a particular project. The regional HCP would describe the processes for establishing mitigation credits and assessing mitigation needs for participants, instead of identifying specific properties for potential acquisition. The administration of a regional HCP with a conservation banking strategy requires that the credits be carefully and accurately tracked to ensure the proper administration of the bank.

Another approach for structuring a regional HCP is based on regulations designed to either require or provide an incentive for the conservation of endangered species.

### 2.3.1 Alternatives Considered for Detailed Study

Hays County considered specific regional HCP alternatives based on the pre-determined preserve and conservation banking models. The County considered the following four alternatives, which are included in the EIS for detailed study:

- No Action – Under this alternative, the Service would not issue an incidental take permit to Hays County and Hays County would not implement a regional HCP. Population growth and development would likely continue as forecast and under the No Action Alternative, and there would be no countywide conservation effort.
- Proposed Hays County RHCP – This alternative is a regional HCP with a phased conservation banking approach. Under this alternative, the County would acquire habitat preserves over the duration of the plan (with a target acquisition goal of between 10,000 and 15,000 acres) and bank mitigation credits for the covered species. The County would then be able to use for its own projects or sell to RHCP participants a corresponding amount of incidental take authorization for the covered species in Hays County. The total amount of incidental take authorization that would be allowed under this alternative would

be sufficient to cover the anticipated need for such authorization based on estimates of land development, impacts to habitat for the covered species, and RHCP participation.

- Moderate Preserve/Limited Take – This alternative features the acquisition of a modestly sized, pre-determined preserve system and limits the amount of incidental take that would be authorized by the incidental take permit. This alternative illustrates a conservation program that could be relatively easy for the County to afford, but (due to the relatively smaller size of the preserve system compared to the proposed RHCP) might not satisfy the anticipated need for incidental take authorization over the duration of the plan.
- Large-scale Preserve System – This alternative involves a conservation program that utilizes a pre-determined preserve approach. Under this alternative, the preserve system would be large enough to authorize the incidental take of any remaining golden-cheeked warbler or black-capped vireo habitat in Hays County outside of the target acquisition area of the preserve system during the duration of the plan.

### 2.3.2 Alternatives Not Considered for Detailed Study

Two potential alternatives were contemplated, but not considered for detailed study:

#### 2.3.2.1 Regulatory Alternative

As mentioned above, one approach to providing mitigation for a regional HCP is a plan based on regulations designed to either require or provide an incentive for the conservation of endangered species habitat. This approach is not a realistic option for Hays County for several reasons, and was therefore not considered for detailed study in this EIS.

First, Texas counties have limited authority to regulate land use, pursuant to the Texas Constitution. In addition, Chapter 83 of the Texas Parks and Wildlife Code contains a number of specific limitations on the authority of local government to regulate activities for the benefit of endangered species. For example, Section 83.014 of the Texas Parks and Wildlife Code prohibits governmental entities from imposing a "regulation, rule, or ordinance related to endangered species unless the regulation, rule, or ordinance is necessary to implement [a RHCP] for which the governmental entity was issued a Federal permit." The only exception to this prohibition is for regulations that involve groundwater withdrawal. A governmental entity also is prohibited from discriminating against a permit application, and is prohibited from denying a request for utility, water, or wastewater service to land that has been designated a habitat preserve for a regional HCP or as critical habitat for endangered species. Finally, governmental entities are precluded from requiring that a landowner pay a mitigation fee or take any other action as a condition for obtaining a government approval not related to the regional HCP.

In short, the County's ability to pass regulations for the purpose of protecting endangered species is extremely limited, therefore the regulatory approach was not considered for detailed study.

#### 2.3.2.2 County-only Regional HCP

Under this alternative, Hays County would develop a regional HCP that would only cover impacts to the covered species associated with the activities of the County, such as road construction and maintenance, and flood control projects. While Hays County does occasionally require ESA authorization for its infrastructure projects, it was determined that the long-term demand associated with only County projects would be insufficient to establish a meaningful preserve system for the covered species. In addition, this alternative would not materially reduce the Service's workload relating to ESA authorizations within Hays County, nor would this alternative have the effect of encouraging broader ESA compliance by providing more efficient compliance alternatives for other governmental and non-governmental entities within the county. For the foregoing reasons, this alternative was rejected for further analysis.

# 3.0 ALTERNATIVES CONSIDERED FOR STUDY

## 3.1 Description of Alternatives Considered for Study

The No Action alternative reflects the status quo, where the Service does not issue Hays County an incidental take permit and Hays County does not implement a regional HCP. The No Action alternative evaluates projected future conditions against current conditions.

The three action alternatives considered for detailed study are based on a regional HCP framework and have several common elements, including:

- The Plan Area will include all of Hays County;
- The plan duration and permit term will be 30 years from the date of approval (i.e., 2010 through 2039);
- The species covered for incidental take include the golden-cheeked warbler and black-capped vireo;
- The projected area of potential habitat loss for the covered species in Hays County over the duration of the plan would be approximately 22,000 acres for the golden-cheeked warbler and 3,300 acres for the black-capped vireo;
- The typical criteria for a preserve block includes a minimum size of approximately 500 acres;
- The preserve system would be assembled with a mix of fee simple land acquisitions and conservation easements;
- Mitigation credit from preserve acquisitions would be generated based on the amount of potential habitat for covered species on a preserve parcel, typically at a rate of one credit for each acre of potential habitat;
- The County will commit to perpetual monitoring and management of preserves;
- Voluntary participation in the plan that is open to all project proponents whose projects could impact the covered species within Hays County;
- Mitigation for project participants would be assessed based on the amount of potential habitat directly or indirectly impacted by a particular project and paid as a per-acre fee or, in certain circumstances, as land in lieu of fees;
- Seasonal clearing restrictions and oak wilt prevention measures for plan participants to minimize impacts of authorized take on the covered species;
- The County will implement education and outreach programs related to endangered species issues in Hays County and ESA compliance and would

request endangered species information from applicants during the development review process; and

- Funding for plan implementation would be generated by participation fees and contributions from the Hays County general fund. Additional funds and/or land may also be sought from grants, charitable and planned giving, and other sources.

### 3.1.1 Alternative A – No Action

Under the "No Action" alternative, Hays County would not seek and the Service would not issue an incidental take permit, and Hays County would not implement a regional HCP.

Under this alternative, Hays County would continue to be responsible for compliance with the ESA with respect to County projects. Such projects could include the construction or widening of county roads, the upgrading of low water crossings or bridges, and the construction of new county facilities. Compliance with the ESA under the No Action alternative would occur on a project-by-project basis. The County would not provide assistance to other public or private entities seeking to comply with the ESA, nor would the County be involved in efforts to consolidate mitigation from different permitting actions across the county.

For each county-sponsored project that could affect endangered species, the County would be responsible for identifying potential habitat in the project area and conducting species surveys to estimate potential impacts. The County would need to coordinate directly with the Service to determine mitigation needs and obtain incidental take authorization for each project. The County would also need to identify and obtain appropriate conservation land or other forms of mitigation for each project where mitigation for incidental take was required.

Because mitigation for both County and private activities would be assessed on a project-by-project basis, it is likely that mitigation requirements for individual projects would be higher than under a more coordinated conservation approach. Nevertheless, the resulting mitigation lands would likely be small and scattered across the county, since each mitigation commitment would be tailored to the needs of a single, specific project. It is possible that mitigation for County projects could also be obtained outside of the County.

Management and monitoring of relatively small and isolated preserves could be more difficult and costly under the No Action alternative. More intensive management and monitoring could be needed to maintain the mitigation value of these smaller preserves.

Due to the limited conservation value of a system of relatively small and isolated preserves, it is likely that public access to any preserves acquired through individual County ESA authorizations under the No Action alternative would not be allowed.

Under the No Action alternative, Hays County would have no involvement with or responsibility for the actions of non-county entities with respect to ESA compliance. Hays

County would not dedicate staff or funds to assisting the public with compliance and would have no obligation to provide mitigation for incidental take caused by entities other than the County. Like Hays County, other project proponents in the county would be responsible for determining whether compliance with the ESA is necessary for a particular project and individually negotiating with the Service to obtain authorization for incidental take. Individual compliance with the ESA through a Section 7 consultation or a Section 10 incidental take permit is often a time consuming and costly process.

The No Action alternative does not include a public education and outreach component by the County to increase awareness of endangered species issues, provide information on how to minimize impacts to covered species, or facilitate ESA compliance for other entities.

### 3.1.2 Alternative B – Hays County RHCP (Proposed Alternative)

The Hays County RHCP incorporates the County's preferred conservation strategy of establishing a conservation bank that would be assembled on a phased basis with a target acquisition goal of 10,000 to 15,000 acres over the 30-year duration of the plan. Under this alternative, the County would seek incidental take authorization for the covered species that would be sufficient to cover the anticipated need from County projects and RHCP participants, based on estimates of projected habitat loss for the covered species during the duration of the plan and assumptions regarding the amount of participation in the RHCP.

The Hays County RHCP would include all of the provisions common to the three action alternatives, as listed above in Section 3.1.

The County would assemble a preserve system on a phased basis, banking mitigation credits for the covered species as parcels are acquired. The preserve acquisitions would generate mitigation credits based on the number of acres of potential habitat protected for the covered species. Typically, each acre of potential habitat within a preserve parcel would generate one mitigation credit for the RHCP. The credits could be used by the County or sold to plan participants. However, the County would not be able to use or sell more mitigation credits than had been previously created or "banked" by preserve acquisitions.

The Hays County RHCP could provide incidental take authorization for up to 9,000 acres of impact to golden-cheeked warbler habitat and 1,300 acres of black-capped vireo habitat in Hays County. The amount of the total take authorization was based on the projected amount of potential habitat loss in Hays County over the 30-year plan duration and an estimated participation rate in the RHCP of approximately 33 percent for private-sector projects and approximately 75 percent for public-sector projects. Public-sector projects that occur in the RCHP Plan Area may include those proposed by Hays County or other public entities such as cities, the State, municipal utility districts, school districts, and similar entities. The estimated participation rates are based on the general experience of the Balcones Canyonlands Conservation Plan in adjacent Travis County and expectations of higher levels of ESA

compliance in Hays County due to the availability of a streamlined compliance alternative and more visible enforcement of the ESA by the Service. As such, Hays County determined that these estimated participation rates were reasonable for the purpose of forecasting the approximate amount of incidental take authorization that could support operation of the RHCP for the 30-year duration of the plan.

Since it is likely that most large tracts suitable for inclusion in the preserve system would contain a mosaic of habitat and non-habitat areas, the preserve system may ultimately include approximately 10,000 to 15,000 acres in order to generate sufficient mitigation credits to meet the anticipated need for incidental take authorization under the plan (the funding plan illustrated in the RHCP is based on a preserve size of 12,000 acres).

Public access to preserves may be allowed where the biological value of the protected habitat would be preserved. The RHCP would also provide funding for new research to support the conservation of one or more of the evaluation species addressed in the RHCP.

### 3.1.3 Alternative C – Moderate Preserve System with a Take Limit

One of the regional alternatives considered by Hays County features the acquisition of a pre-determined, modestly sized preserve system of approximately 3,000 acres and limits the amount of incidental take authorized by the permit. This alternative illustrates a conservation program that could be relatively easy for the County to afford, but would likely not satisfy the anticipated need for incidental take authorization over the duration of the plan.

The Moderate Preserve/Limited Take alternative would include all of the provisions common to the three action alternatives, as listed above in Section 3.1.

Under the Moderate Preserve/Limited Take alternative, Hays County would identify specific criteria for the location, configuration, habitat composition, and acquisition schedule of the 3,000-acre preserve system. The preserve system would be designed and managed to maximize the conservation value of the protected lands. Hays County would commit to acquiring a preserve system that met the all of the preserve design criteria described in the HCP.

In return for the commitment to acquire a well-designed preserve system that met the identified criteria, Hays County would be authorized to incidentally take a limited area of golden-cheeked warbler or black-capped vireo habitat outside of the pre-determined target acquisition area. The amount of habitat loss for the covered species that would be authorized under this alternative could be as much as approximately 3,600 acres (including approximately 3,240 acres of golden-cheeked warbler habitat impacts and approximately 360 acres of black-capped vireo habitat impacts). Increasing the amount of incidental take authorized under the Moderate Preserve/Limited Take alternative would require a major amendment of the incidental take permit.

The conservation program described in this alternative includes a pre-determined preserve system that identifies properties for possible acquisition that are not already owned by

the County. Therefore, implementing the Moderate Preserve/Limited Take alternative would trigger several provisions of Texas state law related to the development of regional HCPs by local governments. Under state law, the County would be required to acquire the targeted properties within six years of permit issuance.

Since maximizing the mitigation value of the preserve lands would be the primary goal of this conservation program, it is likely that public access to the preserves would not be allowed.

Due to the assumption that only limited financial resources would be available to implement the Moderate Preserve/Limited Take alternative, the plan would likely not allocate resources towards the study and conservation of other potentially rare or sensitive species in Hays County.

### 3.1.4 Alternative D – Large-scale Preserve System

The Large-scale Preserve System alternative would create a regional plan administered by Hays County with a conservation program utilizing a pre-designed preserve approach. Under this alternative, the preserve system would be large enough to authorize the incidental take of any remaining golden-cheeked warbler and black-capped vireo habitat in Hays County outside of the target acquisition area of the preserve system during the term of the permit.

The Large-scale Preserve alternative would include all of the provisions common to the three action alternatives, as listed above in Section 3.1.

Under the Large-scale Preserve System alternative, Hays County would identify specific criteria for the location, configuration, habitat composition, and acquisition schedule of the preserve system. The preserve system would be designed and managed to maximize the conservation value of the protected lands. Hays County would commit to acquiring a preserve system that met all of the criteria described in the plan.

Under this alternative, Hays County would assemble a pre-determined preserve system of 30,000 acres including areas of high quality potential habitat for the golden-cheeked warbler and black-capped vireo. For the purposes of this analysis, it is assumed that 90 percent of the preserve system will be managed for the golden-cheeked warbler (approximately 27,000 acres) and 10 percent will be managed for the black-capped vireo (approximately 3,000 acres). The County would be able to permit incidental take associated with the loss or degradation of the any of the remaining approximately 143,000 acres of potential golden-cheeked warbler habitat and approximately 20,000 acres of potential black-capped vireo habitat in Hays County during the term of the incidental take permit.

However, population growth and land development estimates indicate that not all of the remaining habitat is likely to be impacted during the duration of the plan. The County estimates that only approximately 22,000 acres of golden-cheeked warbler habitat and 3,300 acres of black-capped vireo habitat would be impacted by public or private-sector projects during the next 30 years.

The conservation program described in this alternative includes a pre-determined preserve system that identifies properties for possible acquisition that are not already owned by the County. As such, implementing the Large-scale Preserve alternative would trigger several provisions of Texas state law related to the development of regional habitat conservation plans by local governments. Under state law, the County would be required to acquire the targeted properties within six years of permit issuance.

Given the size of the preserve system proposed under this alternative, it is likely that limited public access to the preserves would be allowed.

Under this alternative, the County would also seek to include specific conservation measures for one or more of the other rare and/or endemic species in Hays County that are listed in Table 1-1. Conservation measures for these species could include specific management and monitoring provisions benefiting karst and/or aquatic species, research programs designed to increase the body of knowledge about these species and their habitats, and education or outreach programs to inform the public about issues concerning the threats to and conservation of these species.

## 3.2 Comparison of Alternatives

The primary characteristics of the four alternatives described above are summarized in Table 3-1.

**Table 3-1. Comparison of the Alternatives Considered for Detailed Analysis.**

| Plan Characteristic | Alternatives | | | |
|---|---|---|---|---|
| | A - No Action | B - Hays County RHCP | C - Moderate Preserve/Limited Take | D - Large-scale Preserve |
| Conservation Strategy | Project-by-Project Consultations | Regional HCP with a Phased Conservation Bank | Regional HCP with a Pre-determined Preserve System | Regional HCP with a Pre-determined Preserve System |
| Incidental Take Authorization: | | | | |
| GCW | unknown | 9,000 acres | 3,240 acres | 143,000 acres |
| BCV | unknown | 1,300 acres | 360 acres | 20,000 acres |
| Preserve Size | unknown | approximately 10,000 to 15,000 acres | 3,000 acres | 30,000 acres |
| Mitigation Ratio | likely 1 acre of mitigation for each acre of impact | typically 1 acre of mitigation for each acre of impact | typically less than 1 acre of mitigation for each acre of impact | typically less than 1 acre of mitigation for each acre of impact |

**Table 3-1. Comparison of the Alternatives Considered for Detailed Analysis.**

| Plan Characteristic | Alternatives | | | |
|---|---|---|---|---|
| | A - No Action | B - Hays County RHCP | C - Moderate Preserve/Limited Take | D - Large-scale Preserve |
| Education and Outreach Program | No | Yes (for all species included in Table 1-1) | Yes (only for covered species) | Yes (for all species included in Table 1-1) |
| Public Access to Preserves | Not Likely | Yes - with limitations | Not Likely | Yes – with limitations |
| Conservation of Other Species | Not Likely | Yes | Not Likely | Yes |

# 4.0 AFFECTED ENVIRONMENT

## 4.1 Identification of the Affected Environment (Impact Topics)

The description of the affected environment establishes the current environmental conditions considered by the Service to be affected by the alternatives, including the Proposed Action (USFWS 2003). In addition, in accordance with 40 CFR 1502.15, the data and analyses presented in this EIS are commensurate with the importance of the impact, whereby less important material is summarized, consolidated, or simply referenced. If specific resources would not be affected or if the impacts would be negligible (i.e., the impact would be at a low level of detection), they are listed as "issues and impact topics considered but dismissed" and not described or analyzed in detail in the "Affected Environment" and "Environmental Consequences" sections of the EIS.

In identifying which resources have the potential to be affected by the alternatives, it is important to keep in mind that NEPA regulations require the analysis of "no action" as a benchmark that enables decision makers to compare the magnitude of environmental effects of the action alternatives (USFWS 2003). If no difference is anticipated between the future condition under the No Action alternative and the action alternatives, then there is no impact to analyze. It is imperative, therefore, to clearly understand and articulate the assumptions used in defining the effects of "no action."

In the case of this EIS, the No Action alternative is defined as the conditions that can be expected if the Service does not implement the proposed action (i.e., the issuance of an incidental take permit to support the Hays County RHCP) or one of the other action alternatives. Under the No Action alternative, the current trends projected for human population growth and associated land development in Hays County will continue and impacts to listed species would be authorized under existing Federal programs.

Neither the proposed RHCP nor the other action alternatives would take the place of existing ESA compliance mechanisms. Rather, the action alternatives provide a voluntary, alternative means of compliance with the ESA for many landowners and other public and private entities in Hays County, as well as for the County itself. Issuing the requested incidental take permit, therefore, is not an "indispensable prerequisite" or an "essential catalyst" for land development in the County, and only the most general causal relationship can be established between issuance of the Permit and potential impacts of development. Similarly, just as implementing an RHCP would not enable land development; failure to implement an RHCP would not impede development because alternative means of ESA compliance are available.

It is possible that the greater efficiency and lower cost of ESA compliance offered by the proposed RHCP or other action alternatives could affect the timing and footprint of specific projects in minor ways. For example, a landowner holding off from developing because of the

costs of obtaining an individual incidental take permit (i.e., costs related to legal and consulting fees for preparation of a habitat conservation plan and NEPA documentation) may decide to develop sooner were a regional HCP option to become available. Another landowner concerned that the time it takes to get an incidental take permit may cause a development project to "miss the market" or will stretch carrying costs too far, may determine that the availability of a regional HCP alleviates those concerns sufficiently to justify moving forward. And yet another landowner who is contemplating an avoidance strategy because it looks cheaper and faster than getting an incidental take permit may determine that participation in a regional HCP is sufficiently cost effective as to justify causing some minor habitat impacts.

In all of those scenarios, development happens either somewhat faster than the No Action alternative or there may be somewhat more impact to habitat than under the No Action alternative. Conversely, implementation of a regional HCP will encourage increased compliance with the ESA by providing a more efficient alternative for ESA authorization. The existence of the proposed RHCP or one of the other action alternatives may, in fact, reduce current levels of unpermitted and, therefore, unmitigated loss of habitat for the covered species. This increase in compliance and the associated mitigation provided with compliance may, in fact, offset any marginal increases in impact associated with a regional HCP causing some development to happen somewhat more quickly or with somewhat greater habitat impact.

These differences between the development scenarios under the No Action alternative and the regional HCP action alternatives, however, are likely to be minor for several reasons. First, the regional HCP alternatives are unlikely to induce market demand or in any other way be a "market maker" for development. Rather, the differences identified above operate at the margin of the economics of specific development projects that are being contemplated because of a complex matrix of economic, legal, and demographic factors affecting the market. It is unlikely that a developer would perceive of a regional HCP alone as justification for moving into the market, when those other factors do not support doing so. In other words, very few development projects rest exclusively on the speed and cost of ESA compliance as the primary justification for whether to engage in the development project.

Second, even for those projects for which ESA compliance is a driver in terms of the timing and footprint for the project, not all will necessarily find a regional HCP alternative to be more desirable than the other ESA compliance options. Finally, for those few projects that perceive of ESA compliance timing and cost as defining the tipping point for when to develop and how much habitat to impact, not all of them will find the difference a regional HCP makes in general to make the difference specifically for the project.

Overall, therefore, few projects are likely to find that a regional HCP makes all the difference in terms of when and where to develop. For these reasons, it is reasonable to assume that the regional HCP action alternatives, compared to the No Action alternative, will have only

minor impacts on the countywide extent, timing, and placement of development and any associated impacts to habitat for the covered species over the next 30 years.

This is a valid assumption since project proponents with endangered species issues will have the ability to complete their projects and remain in compliance with the ESA through currently available alternative means (e.g., avoidance of impacts or compliance via individual ESA authorizations). Project proponents may also complete development projects without regard for potential endangered species habitat, and thereby risk violation of Section 9 of the ESA.

Issuing the requested incidental take permit is not an indispensable prerequisite or an essential catalyst for economic development in Hays County. Therefore, a causal relationship cannot be established between issuance of the permit and the impacts of specific development or land use activities. This critical consideration limits the affected environment to those resources for which a causal relationship can be reasonably established between the resource and the take authorized by the requested permit, the proposed mitigation, or funding and administration of the regional HCP.

While Federal regulatory programs other than the ESA might trigger more comprehensive environmental assessment documentation in particular development project scenarios, it is unlikely that a countywide EIS-level review would be compiled for any one project or in the aggregate. By contract, this EIS provides and environmental impact assessment of relevant impacts for the No Action alternative and the action alternatives. Accordingly, and consistent with CEQ regulations, impacts are discussed in this EIS in proportion to their significance.

Section 4.1.1 of this EIS identifies those resources and issues that may be affected by the authorized take, proposed mitigation, or funding and administration of the action alternatives described in Section 3. These resources and issues that comprise the affected environment are described in detail in the sections below. Section 4.1.2 of this EIS identifies resources and issues that are not likely to be affected by the authorized take, proposed mitigation, or funding and administration of the action alternatives, and provides only enough discussion to show why more study is not warranted (40 CFR 1502.2(b)).

### 4.1.1 Impact Topics Identified for Detailed Analysis

The impact topics or components of the human environment that are likely to be affected or could potentially be affected beyond a negligible level by the authorized take, proposed mitigation, or funding and administration of the action alternatives are listed below. The area of potential effect of the action alternatives on the natural or socioeconomic resources analyzed in this EIS is Hays County, since the authorized take, proposed mitigation, and funding and administration of the action alternatives would occur only within Hays County. However, the potential significance of the effects of the action alternatives on the natural and

socioeconomic resources may depend on the overall context of a particular resource that could extend beyond the boundary of the county.

The impact topics described and analyzed in detail in this EIS are:

- Water Resources: Important surface and groundwater resources occur throughout Hays County, and water quality and quantity issues are generally a concern for Hays County citizens. These water resources may also be essential habitat components for some listed species (although listed aquatic species are not covered for incidental take under the action alternatives). Water resources, where they overlap with potential habitat for the covered species, could be affected by activities that result in authorized incidental take of the covered species (primarily activities resulting in habitat loss) or by conservation measures proposed under the action alternatives.
- Vegetation: Vegetation could be affected within Hays County with the implementation of an action alternative, since take of the covered species would be expressed as a specified number of acres of potentially suitable habitat lost or modified, and because mitigation for that take would be the preservation and management in perpetuity of an equivalent amount of suitable habitat for the covered species.
- General Wildlife: Wildlife occupying the habitats that would be lost or modified as a result of activities covered for incidental take and areas protected and managed as mitigation could be affected by the action alternatives.
- Covered Species, Evaluation and Additional Species, and Other Special Status Species: Special status species include the two covered species, 40 evaluation species, 16 additional species, and a variety of other "special status" species in Hays County, such as the listed species in Hays County that are not addressed by the regional HCP alternatives. These species could be affected by the action alternatives in relation to the habitats that would be taken and protected.
- Socioeconomic Resources: While implementation of the action alternatives is not expected to affect overall county-wide trends for population growth, demographics, income, employment, or housing in Hays County (as described later, these socioeconomic factors are driven more by regional economic conditions than by local activities), these aspects of the human environment are important to understanding the interaction between people and the natural environment. Thus these resources are considered in the analysis below. The action alternatives could also affect the ability of the County to provide services and could affect the cost of ESA compliance for project proponents in Hays County and for the Service.

### 4.1.2 Issues and Impact Topics Considered but Dismissed from Detailed Analysis

The Proposed Action is issuance of an incidental take permit to Hays County that would authorize the incidental take of the golden-cheeked warbler and black-capped vireo in Hays County under a regional HCP. As described in Section 4.1, issuing an incidental take permit to Hays County under one of the action alternatives is not an indispensable prerequisite or an essential catalyst for economic development in Hays County. Therefore, this EIS assumes that the regional HCP action alternatives, compared to the No Action alternative, will have only minor impacts on the countywide extent, timing, and placement of development and any associated impacts to habitat for the covered species over the next 30 years. Since a causal relationship cannot be established between issuance of the permit and the impacts of specific land development or land use activities, the affected environment is limited to those resources for which such a relationship can be reasonably established between the resource and 1) the take authorized by the requested permit; 2) the proposed mitigation; or 3) funding and administration of the regional HCP. If specific resources would not be affected by the action alternatives or if the impacts would be negligible compared to the No Action alternative (i.e., the impact would be at a low level of detection), they are addressed in this section of the EIS as "issues and impact topics considered but dismissed."

In accordance with the criteria for implementing NEPA (40 CFR 1500), the Service has determined that the resources discussed in this section are not likely to be affected by the authorized take, proposed mitigation, or funding and administration of the action alternatives described above. As stated in the CEQ regulations for preparing an EIS (40 CFR 1502), impacts shall be discussed in proportion to their significance, and there shall be only brief discussion of issues that are not significant. Consequently, the remaining resources are not described or analyzed in detail in this EIS.

Several of the resources or issue topics listed below could be affected by individual land development or land use activities conducted by potential RHCP participants. However, for the reasons explained in Section 4.1 above, issuance of the incidental take permit cannot be shown to cause such impacts, even indirectly, because the same activities could (and would likely) proceed under all of the alternatives, including the No Action alterative. Therefore, issuance of the permit is not reasonably and foreseeably likely to cause more than negligible potential impacts to the following topics discussed below.

#### 4.1.2.1 Energy and Depletable Resource Requirements and Conservation Potential

The regional HCP alternatives considered in this EIS do not have an energy or resource extraction component and would not require more or less energy or depletable resources than the No Action alternative. Therefore, these topics are dismissed from further analysis.

#### 4.1.2.2 Prime and Unique Agricultural Lands

Soil data from the Natural Resources Conservation Service indicate that approximately 122,655 acres of prime farmland soils occur in Hays County. Most of these prime soils (approximately 64 percent of the total) occur east of Interstate Highway 35 and would not be affected by the regional HCP action alternatives, since participating projects and potential preserve lands would be located west of Interstate Highway 35. In addition, the removal of suitable habitat for the covered species would not be expected to remove prime farmlands from agricultural production, since woodland and shrubland habitats used by the covered species are most typically used as rangeland, not for crop production. Similarly, incidental inclusion of prime farmlands in preserve parcels would not be expected to add prime farmland soils to production, even if they are protected from future development. Therefore, the activities associated with the authorized take, proposed mitigation, or funding/administration of a regional HCP under one of the action alternatives would have only negligible impacts on prime farmland soils in Hays County and this resource is dismissed from further analysis.

#### 4.1.2.3 Public Health and Safety

The regional HCP alternatives considered in this EIS would not contribute to or detract from public health or safety considerations. Therefore, these topics are dismissed from further analysis.

#### 4.1.2.4 Archeological Sites, Historic Structures, and Other Cultural Resources

Previously recorded or currently unrecorded archeological or historical sites or structures may occur within participating project areas or within potential future preserve parcels under one of the regional HCP action alternatives. Removal of suitable habitat for the covered species could change the quality of the historical or archeological characteristics of a site or the incidental inclusion of a site in a preserve parcel would protect it from future development. However, the extent to which participating projects or future preserve parcels overlap with cultural resources is largely unknowable, except to restrict these overlaps to the portion of Hays County that includes suitable habitat for the covered species (i.e., generally west of Interstate Highway 35).

Historic and archeological resources are currently protected by State and Federal laws, including the Texas Antiquities Code administered by the Texas Historical Commission and the National Historic Preservation Act. This EIS assumes that the proponents of all projects covered by a regional HCP action alternative would abide by State and Federal regulations regarding cultural resources. Entities proposing projects on property owned by the State or a subdivision of the State are required by the Texas Antiquities Code to coordinate with the Texas Historical Commission and the proponents of any project receiving Federal permits or funding (such as an incidental take permit under the ESA) are required by the National Historic Preservation Act to coordinate with the State Historic Preservation Officer to determine if the

project would affect properties that are included in or that meet the criteria for listing on the National Register of Historic Places.

Therefore, given the existing protections for cultural resources, the activities associated with the authorized take, proposed mitigation, or funding/administration of a regional HCP under one of the action alternatives would have only negligible impacts on archeological, historical, or other cultural resources in Hays County. As such archeological sites, historic structures, and other cultural resources are dismissed from further analysis.

#### 4.1.2.5 Wetlands and Floodplains

Wetlands nationwide are mapped by the Service's National Wetlands Inventory and floodplains are delineated by the Federal Emergency Management Agency. In Hays County, both types of areas are most commonly associated with perennial or seasonal streams or springs. However, given the typically shallow and rocky soils that occur over most of the county (particularly in the portion of the county that contains suitable habitat for the covered species west of Interstate Highway 35), the area does not include large or substantial areas of wetlands. Except for in the vicinity of San Marcos, most mapped floodplains are relatively narrow (i.e., less than approximately 400 feet across).

Activities causing the loss of suitable habitat for the covered species or the designation of preserve parcels could affect wetlands and floodplains where these resources overlap such activities. However, the potential for such overlap is slight, since suitable habitat for the covered species is does not typically occur in wetland areas. Conversely, the incidental inclusion of wetlands and floodplains within preserve parcels would protect such areas from future land development.

Most wetlands and all types of waters of the U.S. are protected by Section 404 of the Clean Water Act, which is administered by the U.S. Army Corps of Engineers. Projects that affect jurisdictional wetlands and waters of the U.S. by discharging dredged or fill material within such features are required to obtain a permit from the Corps prior to construction, and compensatory mitigation may be required to offset any adverse environmental affects.

Hays County participates in the Federal Emergency Management Agency's National Flood Insurance Program. The County has adopted a permitting process under its Floodplain Ordinance that requires approval of all developments in the unincorporated areas of the county.

This EIS assumes that all projects covered by a regional HCP alternative would be implemented in accordance with all applicable regulations regarding wetlands and floodplains.

Since wetlands and floodplains in Hays County are protected by existing regulations, the activities associated with the authorized take, proposed mitigation, or funding/administration of a regional HCP under one of the action alternatives would have only negligible impacts on wetlands and floodplains in Hays County. As such wetlands and floodplains are dismissed from further analysis.

#### 4.1.2.6 Geology

Hays County is underlain by the Edwards Aquifer and the Trinity Aquifer.

The Edwards Aquifer is composed of the porous limestones of the Edwards Group, Georgetown Limestone, and Comanche Peak Limestone formations (Ashworth and Hopkins 1995). The aquifer includes three distinct units, two of which (the San Antonio segment and the Barton Springs segment) occur in Hays County. The groundwater divide between the San Antonio and Barton Springs segments of the Edwards Aquifer is thought to occur west of the City of Kyle. The Trinity Aquifer is composed of Trinity Group geologic formations, which include upper and lower members of the Glen Rose formation in Hays County. The Glen Rose formation outcrops at the surface in portions of Hays County west of the Edwards Aquifer recharge zone (Ashworth and Hopkins 1995, Hays Trinity Groundwater Conservation District 2005).

The removal or alteration of suitable habitat for the covered species would not be expected to affect the underlying geology of an area, but the designation of preserve parcels under a regional HCP action alternative could protect the underlying geology from future development. Overall, none of the alternatives considered in this EIS are expected to have more than negligible impacts on the underlying geology of Hays County. Therefore, general geology is dismissed from further analysis.

The limestone geology of Hays County supports the area's aquifer systems and provides habitat for karst-adapted species. The functions of the region's geology with respect to aquifers and karst habitats, and the potential impacts of the No Action and action alternatives on these functions, are carried through this EIS under the Water Resources and Hays County RHCP Evaluation and Additional Species impact topics.

#### 4.1.2.7 Ambient Noise and Air Quality

The removal or alteration of suitable habitat for the covered species by the use of heavy machinery and/or fire could temporarily add to the ambient noise levels in the vicinity of projects participating in one of the regional HCP alternatives and affect the overall quality of air in the region. However, the magnitude of any such potential effects would be negligible, if detectible at all. For instance, the use of heavy machinery such as tractors, bulldozers, or skid steer vehicles is a common practice for agricultural land management and the use of such equipment to clear habitat for the covered species is similar to the types of land management practices for other agricultural purposes. Additionally, any increases in ambient noise resulting from clearing activities for participating projects would be temporary in nature.

With respect to air quality, the Environmental Protection Agency (EPA) sets National Ambient Air Quality Standards under the authority of the Clean Air Act. The Texas Commission on Environmental Quality monitors air quality within the State and reports the information to the EPA and the public. Central Texas, including Hays County, may not attain

new federal standards for ground-level ozone in 2009, which could trigger new air quality regulations across the region. However, as for noise pollution, the magnitude of any potential effects from machinery or burning activities related to the clearing of habitat for the covered species under a region HCP alternative would be negligible (since these types of activities already occur commonly across the county for agricultural purposes) and would be temporary in nature. Therefore, noise and air quality are dismissed from further analysis.

#### 4.1.2.8 Environmental Justice

Although not required for consideration by CEQ regulations, all EISs must address "Environmental Justice." Environmental justice issues encompass a broad range of impacts covered by NEPA, including impacts on the natural or physical environment and interrelated social, cultural, and economic effects. Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," provides that "each Federal agency shall make achieving Environmental Justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

Minority Populations

According to the Census 2000, approximately 21.1 percent of the Hays County population is of a non-white race (20,575 of 97,589 people) and approximately 29.6 percent of the population is Hispanic or Latino of any race (28,859 of 97,589 people) (these categories may overlap). Therefore, between 20 and 30 percent of the population of Hays County could be considered an ethnic minority. Within Hays County, in Census Tracts generally west of Interstate Highway 35 that contain potential habitat for the covered species (i.e., Census Tracts 10600, 10700, 10801, 10802, 10901, 10902, and 10904) have a non-white population of approximately 12.6 percent (7,555 of 59,754 people) and a Hispanic or Latino population of approximately 19.2 percent (11,490 of 59,754 people).

The populations living in Census Tracts that occur within areas of potential habitat for the covered species would be more likely to be affected by the authorized take and potential mitigation provided under the regional HCP action alternatives. As described above, these populations also have a much lower percentage of minorities than Hays County overall. Therefore, none of the alternatives considered in this EIS are expected to disproportionately affect minority populations.

Poverty Populations

The median household income in Hays County (per Census 2000 data) was $45,006 and approximately 14.3 percent of the county population for which poverty status was determined was living below the poverty line (13,039 of 91,446 people). Within Hays County Census Tracts that contain potential habitat for the covered species, the median household income was $56,342

and approximately 8.0 percent of the population was living below the poverty line (4,680 of 58,555 people for which poverty status was determined).

The populations living in Census Tracts that occur within areas of potential habitat for the covered species would be more likely to be affected by the authorized take and potential mitigation provided under the regional HCP action alternatives. As described above, these populations also have a higher median household income than for Hays County overall and a much lower poverty rate than for the county overall. Therefore, none of the alternatives considered in this EIS are expected to disproportionately affect low-income populations.

While minority and low income populations exist in Hays County, the EIS alternataive are not expected to disproportionately affect these at-risk populations and Environmental Justice is dismissed from further analysis.

As participation in the action alternatives would be completely voluntary, the implementation of a regional HCP alternative is not expected to introduce "Conflicts with Land Use Plans, Policies, or Control." The action alternatives would neither require, nor be enforced by, municipal or county land use ordinances, and they are consistent with Texas state law regarding regional HCPs (Texas Parks and Wildlife Code Chapter 83).

## 4.2 General Description of Hays County

The Plan Area for the alternatives described in this EIS is Hays County, which comprises approximately 434,335 acres. The western three-quarters of Hays County (generally west of Interstate Highway 35) are within the Balcones Canyonlands portion of the Edwards Plateau ecoregion (Griffith et al. 2004). Potential habitat and known locations for the species covered by the action alternatives (i.e., the golden-cheeked warbler and black-capped vireo), as well as the anticipated incidental take and mitigation described in the alternatives, would occur within this region of the county.

Elevations within Hays County range from approximately 600 feet above mean sea level to over 1,400 feet above mean sea level, and gradually increase from east to west. The county is located on the border of the Edwards Plateau and Blackland Prairie ecoregions. The Balcones Escarpment forms the divide between these two ecoregions. Topography west of the escarpment is typically gently rolling to hilly, with steep slopes present along some streams. Topography east of the escarpment is typically flat to gently rolling (Barkley 1970, Dobie 1948).

Hays County occurs within a temperate, humid subtropical region. Winters tend to be mild, with an average minimum temperature in January of approximately 40°F. Summers tend to be hot, with an average maximum temperature in July of approximately 96°F. Average annual rainfall in Hays County is approximately 33.75 inches. Major weather threats include extended dry periods, flash flooding, severe thunderstorms, and tornados (Barkley 1970, Dobie 1948).

According to 2005 Hays County Central Appraisal District data, land uses in Hays County are primarily agricultural (71 percent of the area of the county), with single-family residential use (14 percent of the county) as the next most abundant land use classification. Vacant land is also common in the county, comprising approximately eight percent of the acreage. Other land use categories (including multi-family residential, commercial or industrial, and utility uses) each represent less than one percent of the acreage of the county.

Hays County is situated along the Interstate Highway 35 corridor between the major population centers of Austin and San Antonio. Hays County is included in the Austin-Round Rock Metropolitan Statistical Area (MSA), and was the second fastest growing county in the MSA (which also includes Bastrop, Caldwell, Travis, and Williamson counties) with an estimated 64.7 percent population growth between 1997 and 2007 (RECenter 2008a).

## 4.3 Water Resources

### 4.3.1 Groundwater Resources

Two aquifers underlie parts of Hays County: the Edwards Aquifer and the Trinity Aquifer. The Edwards Aquifer (the Balcones Fault Zone region) extends across portions of 13 Texas counties from Bell County to Kinney County. The Trinity Aquifer extends across a wide band including 55 counties in the central part of Texas (Figure 4-1).

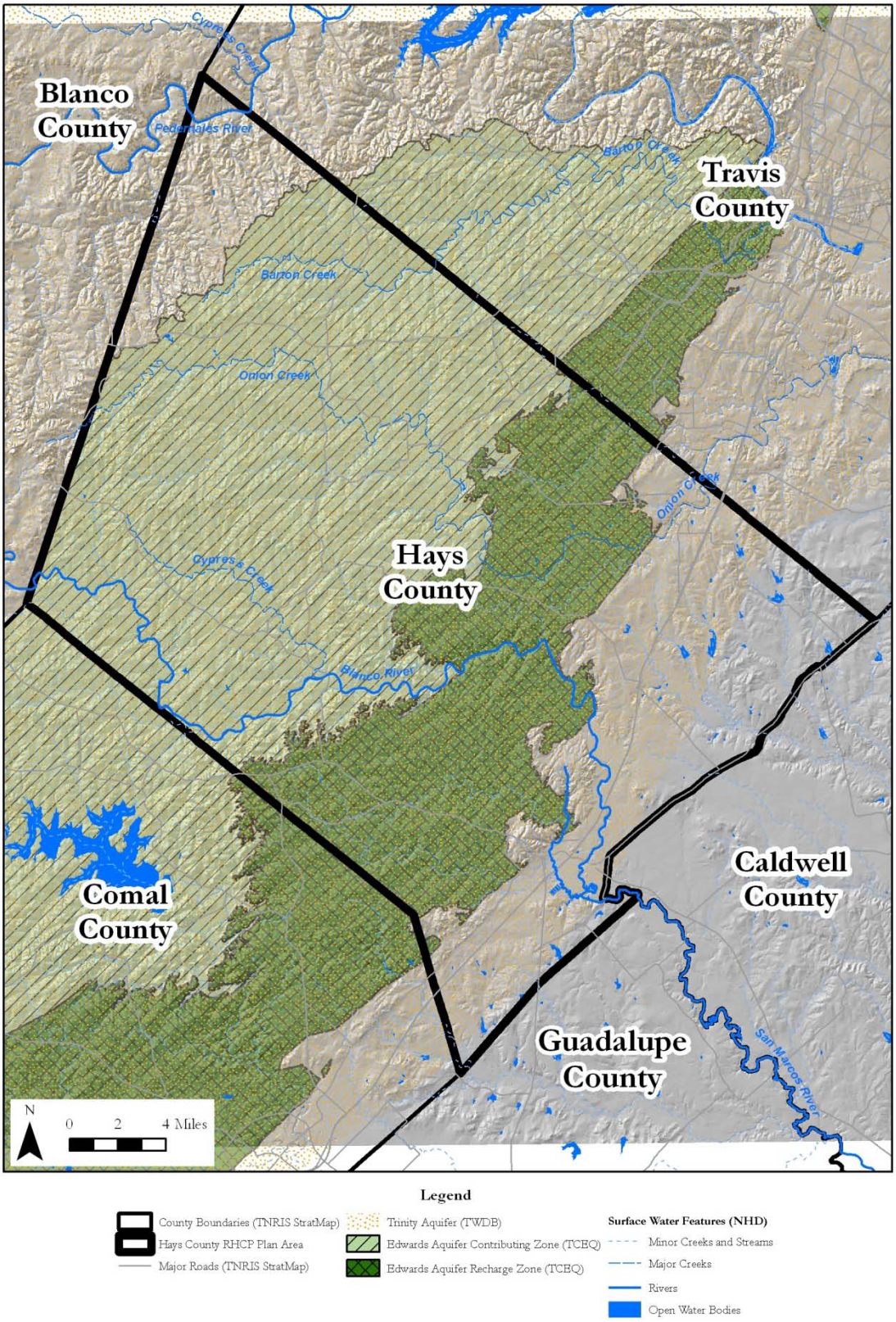
#### 4.3.1.1 Edwards Aquifer

The Edwards Aquifer (the Balcones Fault Zone region) occurs in the porous limestones of the Edwards Group, Georgetown Limestone, and Comanche Peak Limestone formations (Ashworth and Hopkins 1995). It is confined by Glen Rose Limestone below and, in various locations across the state, by Del Rio Clay, Buda Limestone, and the Eagle Ford, Austin, and Taylor and Navarro Groups above (Blome et al. 2005). A series of faults and fractures have tilted these geologic layers, causing portions of the Edwards Group to outcrop at the surface. In Hays County, most of the Edwards Group is unconfined and this outcropping lays generally parallel to and west of Interstate 35 (Figure 4-1).

The Edwards Aquifer includes three distinct units, two of which (the San Antonio segment and the Barton Springs segment) occur in Hays County. The groundwater divide between the San Antonio and Barton Springs segments of the Edwards Aquifer generally occurs between the cities of Buda and Kyle. Groundwater within the San Antonio segment of the Edwards Aquifer generally travels from recharge areas in the southwest portion of the segment to discharge points along the northeastern edge of the segment. San Marcos Springs in Hays County is one of the primary outlets for groundwater from the San Antonio segment of the Edwards Aquifer (72 FR 39247). The Barton Springs segment of the Edwards Aquifer extends from just north of the City of Kyle into south Austin in Travis County. Groundwater from Hays County in this segment of the aquifer generally flows northeast. Barton Springs in the City

of Austin is the primary discharge point for this segment of the aquifer (Barton Springs Edwards Aquifer Conservation District 2008).

**Figure 4-1 Major Water Features and Aquifers in Hays County.**



The drainage basin (also known as the contributing zone) of the San Antonio and Barton Springs segments of the Edwards Aquifer covers approximately 5,400 square miles over portions of 13 counties on the Edwards Plateau. Surface water collected in the contributing zone flows south and east to the recharge zone of the aquifer, where the water-bearing limestones of the aquifer are exposed at the surface (Eckhardt 2008).

The Edwards Aquifer recharge zone is an area of porous limestone bedrock with numerous underground cavities and passages (i.e., karst terrain). Recharge features, such as caves and sinkholes, allow water from the contributing zone to infiltrate the underground passages of the aquifer. The recharge zone of the San Antonio and Barton Springs segments covers approximately 1,250 square miles over six counties on the southern and eastern edge of the aquifer system (Eckhardt 2008).

Water is stored within the aquifer's artesian zone, where impermeable overlaying and underlying geologic formations trap the groundwater within the aquifer. The artesian zone covers approximately 2,100 square miles and underlies all or a portion of ten counties. Groundwater within the artesian zone flows along the Balcones Fault Zone on the eastern edge of the aquifer where it is discharged under pressure at spring outlets, including San Marcos Springs (USFWS 1995, Edwards Aquifer Authority 2006).

#### 4.3.1.2 Trinity Aquifer

The Trinity Aquifer is composed of Trinity Group geologic formations, which include upper and lower members of the Glen Rose formation in Hays County, and extends across a wide band including 55 counties in the central part of Texas. The Glen Rose formation outcrops at the surface in portions of Hays County west of the Edwards Aquifer recharge zone (Ashworth and Hopkins 1995, Hays Trinity Groundwater Conservation District 2005).

The primary source of water entering the Trinity Aquifer is from rainfall on the outcropping Glen Rose limestone formations. Caverns and other passages formed by the dissolution of limestone can function as groundwater conduits or create sinkholes that provide recharge substantial recharge to the aquifer. Regional groundwater flow within the Trinity Aquifer is typically to the south and southeast (Hays Trinity Groundwater Conservation District 2005). Major springs in Hays County discharging water from the Trinity Aquifer include Jacob's Well, located near Wimberley.

#### 4.3.1.3 Aquifer Recharge

Recharge to the Edwards and Trinity aquifers is primarily derived from rainfall in their contributing zones, which flows overland and via streams until seeping into fissures, caves, and other karst features in the bedrock. For the Edwards Aquifer, a well defined recharge zone contains highly faulted and fractured outcrops of Edwards limestones at the surface that allow large quantities of surface water to flow into the aquifer. Unlike the Edwards Aquifer, the Trinity Aquifer recharges very slowly. Only four to five percent of the rainwater water that falls

over the Trinity Aquifer's drainage basin recharges the aquifer. Water also moves through the Trinity Aquifer more slowly than through the Edwards Aquifer (Eckhardt 2008, Blome et al. 2005).

Significant Recharge Features

A "significant recharge feature" is defined by the Texas Commission on Environmental Quality (TCEQ) as a karst feature with a well-defined surface opening (such as a cave) or a sinkhole (without a surface opening) that has a catchment area greater than 1.6 acres (0.6 hectare) (TCEQ 2004).

The total number of these features that may occur in Hays County is not known. However, the Texas Speleological Survey database includes 157 records of cave features and 142 records of karst features in Hays County (Texas Speleological Survey 2008).

Factors Influencing the Amount of Aquifer Recharge

There are numerous ways to decrease or degrade water that enters (or recharges) aquifers. One way is to cover, cap, or fill recharge features, thereby preventing water from entering them and recharging the aquifer. Similarly, impervious cover (such as from pavement and buildings) may decrease aquifer recharge by reducing the area of soil into which rainfall can infiltrate. While much of the water flowing off impervious surfaces is directed to nearby streams, storm water runoff often occurs in short bursts of high volume flows that provide few opportunities for runoff to infiltrate recharge features before it leaves the recharge zone.

Large stands of woody vegetation may reduce the amount of precipitation reaching groundwater. Dense canopy cover intercepts rainwater, may inhibit infiltration into the soil by dropping leaf litter, and may draw off soil moisture through transpiration (Owens 2006). On the other hand, this retained rainwater moisture may result in decreased transpiration rates and lesser needs for soil moisture (Owens 2006).

#### 4.3.1.4 Groundwater Quality

The chemical quality of the water in the Edwards Aquifer is typically fresh, but hard, with dissolved solids concentrations averaging less than 500 milligrams/liter (Ashworth and Hopkins 1995). Water quality from the Trinity Aquifer is acceptable for most municipal and industrial purposes; however, concentrations of certain constituents in some areas exceed drinking water standards (Brazos G Regional Water Planning Group 2006). Bush et al. (2000) detected numerous organic chemicals in the Edwards Aquifer, fewer in the Trinity Aquifer, but most concentrations were very low relative to drinking-water standards and guidelines.

The State of Texas has not developed specific standards for pollutant discharge to groundwater; however, state policy requires that "…groundwater be kept reasonably free of contaminants that interfere with present and potential uses of groundwater… [and that] discharges of pollutants,…be conducted in a manner that will maintain present uses and not

impair potential uses of groundwater or pose a public health hazard" (Texas Water Code § 26.401). Groundwater contamination, as defined by the Texas Groundwater Protection Committee, is "…the detrimental alteration of the naturally occurring physical, thermal, chemical, or biological quality of groundwater reasonably suspected of having been caused by the activities of entities under the jurisdiction of the various state agencies" (Texas Groundwater Protection Committee 2006). The state agencies of the Committee systematically monitor groundwater quality at selected sites (e.g., underground storage tanks and landfills) throughout the state to determine if levels of specific contaminants vary from baseline conditions for that site. The Texas Groundwater Protection Committee (2006) reported that 6,132 groundwater contamination cases were documented or under enforcement across the state during the 2005 calendar year.

Groundwater quality protection in western Hays County is largely governed by the Edwards Aquifer Rules (30 Texas Administrative Code, Chapter 213), which regulate activities having the potential for polluting the Edwards Aquifer and associated surface waters. The TCEQ guidance for complying with the Edwards Aquifer Rules (Barrett 2005) recommends the use of setbacks (natural buffers) to prevent groundwater degradation associated with sensitive karst features.

The September 2007 "Optional Enhanced Measures for the Protection of Water Quality in the Edwards Aquifer" and "Optional Enhanced Measures for the Protection of Water Quality in the Edwards Aquifer and Related Karst Features that May Be Habitat for Karst Dwelling Invertebrates" are appendices to the TCEQ technical guidance document detailing best management practices for compliance with the Edwards Aquifer Rules (Title 30, Texas Administrative Code, Chapter 213). The Service concurred that implementation of these voluntary water quality measures "will protect endangered and candidate species from impacts due to water quality degradation". The voluntary measures, if fully implemented by a project proponent, will result in "no take" of the species addressed by the measures due to water quality impacts.

Hays County has limited authority to regulate the management stormwater under Chapter 725 of its Development Regulations (adopted August 18, 2009), mostly with respect to flood control issues. However, the County's Development Regulations do provide economic incentives for voluntary implementation of water quality protection measures, including stream buffers, control of the hydrologic regime, and structural and non-structural best management practices consistent with the water quality protection criteria of the Lower Colorado River Authority, the City of Austin, TCEQ, and other local jurisdictions. In addition to Hays County and TCEQ, local jurisdictions in Hays County (including the cities of Austin, Buda, Kyle, Dripping Springs, and San Marcos) each have regulations concerning water quality protections for projects over the Edwards Aquifer recharge zone (including the Barton Springs segment of the aquifer).

### 4.3.2 Surface Water

4.3.2.1 Water Features

Hays County lies within the Colorado and Guadalupe river basins, and is crossed by several rivers and major creeks, including the Blanco River, San Marcos River, Pedernales River, Cypress Creek, Onion Creek, and Barton Creek (Figure 4-1). These major waterways, and the numerous minor streams and creeks that feed them, are valuable surface water resources for the County and support wildlife, riparian habitat, recreational uses, and scenic vistas.

Hays County falls within Region K (Lower Colorado) and Region L (South Central Texas) Water Planning Areas, two of the 16 planning regions established by the Texas Water Development Board (TWDB). The Region K and Region L Water Planning Areas have classified portions of Barton Creek, Cypress Creek, and the San Marcos River as "ecologically significant," in accordance with TWDB rules (31 Texas Administrative, Chapter 357.8). TPWD described the features of these ecologically significant stream segments, as reported below (TPWD 2007):

- Barton Creek – from the confluence with Town Lake in Austin in Travis County upstream to Ranch Road 12 in Hays County. This segment contains high water quality, exceptional aquatic life, and high aesthetic value. It is described as an ecoregion stream with a diverse benthic macroinvertebrate community. In addition, this segment is classified as containing threatened or endangered species/unique communities with the only known location of the Barton Springs salamander.
- Cypress Creek – from the confluence with the Blanco River in Hays County upstream to a point four miles upstream of the most upstream named county road crossing in Hays County. This ecologically significant portion of Cypress Creek serves an important hydrological function within the Edwards Aquifer recharge zone and contains high water quality, exceptional aquatic life, and high aesthetic value.
- San Marcos River – from a point 0.7 mile downstream of Interstate Highway 35 in Hays County to a point 0.4 mile upstream of Loop 82 in San Marcos; and from the confluence with the Guadalupe River in Gonzales County upstream to a point 0.7 mile downstream of Interstate Highway 35 in Hays County. This portion of the San Marcos River displays significant overall habitat value considering degree of biodiversity and uniqueness observed in aquatic habitat. It serves a valuable hydrologic function relating to groundwater discharge of the Edwards Aquifer and is within a riparian conservation area that contains several city and university parks. This portion of the San Marcos River also contains high water quality, exceptional aquatic life, high aesthetic value, and exceptional aquatic life use. In addition, it is known to contain threatened or endangered species/unique communities including the fountain darter and the Comal Springs riffle beetle, and is the only known location of Texas wild rice and the San Marcos salamander.

Several notable spring systems occur in Hays County, including San Marcos Springs, Fern Bank Springs, and Jacob's Well. Many other minor springs also occur across the county, discharging water from the Edwards Aquifer, Trinity Aquifer, and local groundwater sources. The Texas Speleological Survey database includes records of 52 springs in Hays County (Texas Speleological Survey 2008). These springs, and the karst features that often connect them to the aquifers, provide habitat for several rare species, including karst invertebrates and salamanders. San Marcos Springs and Fern Bank Springs have been identified as critical habitat for several federally listed species (USFWS 2007a).

#### 4.3.2.2 Surface Water Quality

Under the Clean Water Act, the State of Texas (through the TCEQ) has developed and enforces a comprehensive set of surface water quality standards that include chemical, physical, and biological criteria. The Texas Surface Water Quality Standards are found in the Texas Administrative Code under Title 30, Chapter 307 and establish explicit water quality goals throughout the state for all types of surface water sources.

The state standards, which are set in an effort to maintain the quality of water in the state consistent with public health and enjoyment, protection of aquatic life, and the operation of existing industries and economic development, are evaluated via the following five categories: aquatic life, contact recreation, public water supply, fish consumption, and general uses. Standards related to drinking water also apply to groundwater that is used as a public water supply.

Every two years, the TCEQ assesses water quality and submits a report to the U.S. Environmental Protection Agency (EPA) regarding how each body of water meets the state water quality standards. This water quality inventory is the basis of the Clean Water Act 303(d) list, which identifies all "impaired" water bodies that do not meet the water quality criteria established to support designated uses.

According to the 2008 Texas Water Quality Inventory and 303(d) List, portions of one waterway within Hays County is impaired (TCEQ 2008a). Plum Creek (Segment 1810), from the confluence with the San Marcos River in Caldwell County to FM 2770 in Hays County, was identified as impaired for recreational use due to elevated bacteria counts (TCEQ 2008a).

The Texas Pollutant Discharge Elimination System (TPDES) program gives the TCEQ Federal regulatory authority over discharges of pollutants to Texas surface waters, with exception to discharges associated with oil, gas, and geothermal exploration and development activities that are regulated by the Railroad Commission of Texas. The TPDES permitting program is designed to minimize sedimentation and contamination in surface waters by regulating point source pollution to surface water in Texas.

Both the Texas Water Code and Texas Local Government Code allow municipalities to create and enforce ordinances to protect water quality that can be applied to all developments

within municipal jurisdictions. Hays County has subdivision regulations that require stormwater runoff from new developments to be detained on-site, such that the peak discharge rate is equal to or less than the rate when the property was in its natural state. The cities of Austin, San Marcos, Kyle, Buda, and Dripping Springs each have water quality protection ordinances related to land development projects that may be applicable to projects in Hays County.

Hays County coordinates with a variety of local and regional organizations to further enable water quality protection, including the Guadalupe Blanco River Authority, the Barton Springs/Edwards Aquifer Conservation District, and both the Lower Colorado and the South Central Texas Regional Water Planning Groups. These associations promote land development with minimal impacts and require varying levels of water quality protection, permitting, and management. Hays County and several cities within the county also participate in the Regional Water Quality Plan for the Barton Springs Segment of the Edwards Aquifer and Its Contributing Zone.

### 4.3.3 Water Use

Communities in Hays County, including Buda, Dripping Springs, Kyle, San Marcos, and Wimberley, use groundwater for municipal, industrial, agricultural, and other non-consumptive uses. Canyon Regional Water Authority and the Guadalupe-Blanco River Authority are two of the primary wholesale water providers operating in the county.

## 4.4 Vegetation

Hays County lies on the edge of the Edwards Plateau and Texas Blackland Prairie ecoregions, as described by the U.S. Environmental Protection Agency (EPA) (Griffith et al. 2004). The western three-quarters of Hays County (generally west of Interstate Highway 35) are within the Balcones Canyonlands portion of the Edwards Plateau ecoregion. The Area of Potential Effect for this EIS includes only the Balcones Canyonlands ecoregion.

According to TPWD (McMahan et al. 1984), three general vegetation communities are present within the Area of Potential Effect in Hays County: Live Oak-Ashe Juniper Parks, Live Oak-Mesquite-Ashe Juniper Parks, and Live Oak – Ashe Juniper Woods.

The Live Oak-Ashe Juniper Parks and Live Oak-Mesquite-Ashe Juniper Parks vegetation communities primarily exist on level to gently rolling uplands and ridge tops within the Edwards Plateau. The dominant trees in these vegetation communities include plateau live oak (*Quercus fusiformis*), Ashe juniper (*Juniperus ashei*), and honey mesquite (*Prosopis glandulosa*). Commonly associated vegetation includes Spanish oak (*Q. buckleyi*), shin oak (*Q. sinuata* var. *breviloba*), cedar elm (*Ulmus crassifolia*), netleaf hackberry (*Celtis reticulata*), flameleaf sumac (*Rhus lanceolata*), agarito (*Berberis trifoliolata*), Texas persimmon (*Diospyros texana*), Texas pricklypear (*Opuntia engelmannii*), kidneywood (*Eysenhardtia texana*), saw greenbriar (*Smilax bona-nox*), Texas wintergrass (*Stipa leucotricha*), little bluestem (*Schizachyrium scoparium*), curly mesquite (*Hilaria belangeri*), Texas grama (*Bouteloua rigidiseta*), Hall's panicum (*Panicum hallii*), purple three-awn

(*Aristida purpurea*), hairy tridens (*Tridens pilosum*), cedar sedge (*Carex planostachys*), two-leaved senna (*Cassia roemeriana*), mat euphorbia (*Euphorbia serpens*), and rabbit tobacco (*Evax prolifera*) (McMahan et al. 1984).

The Live Oak – Ashe Juniper Woods vegetation community primarily exists on shallow limestone soils on the hills and escarpment of the Edwards Plateau. In addition to the dominant plateau live oak and Ashe juniper trees, commonly associated vegetation includes Spanish oak, shin oak, cedar elm, evergreen sumac (*Rhus virens*), escarpment cherry, saw greenbriar, Texas mountain laurel (*Sophora secundiflora*), poison ivy (*Toxicodendron radicans*), twistleaf yucca (*Yucca rupicola*), elbowbush (*Forestiera pubescens*), cedar sedge, little bluestem, Texas grama (*Bouteloua rigidiseta*), meadow dropseed (*Sporobolus asper* var. *hookeri*), Texas wintergrass, curly mesquite, pellitory (*Parietaria pensylvanica*), noseburn (*Tragia ramosa*), spreading sida (*Sida filicaulis*), woodsorrel (*Oxalis* spp.), mat euphorbia (McMahan et al. 1984).

Along perennial watercourses within Hays County, bald cypress (*Taxodium disticum*), sycamore (*Platanus occidentalis*), and (to a lesser extent) black willow (*Salix nigra*) are dominant. Buttonbush (*Cephalanthus occidentalis*) is typically prominent in the riparian shrub stratum. Intermittent streams and creeks may support sycamore woodlands or (in the case of drier sites) cedar elm may dominate. Floodplains within the Balcones Canyonlands ecoregion are typically dominated by a combination of oak-elm-hackberry gallery forests with varying woodland species such as box elder (*Acer negundo*), soapberry (*Sapindus* sp.), Ashe juniper, pecan (*Carya illinoensis*), eastern cottonwood (*Populus deltoides*), plateau live oak, Spanish oak, green ash (*Franixus pennsylvanica*), cedar elm, red mulberry (*Morus rubra*), and occasionally basswood (*Tilia caroliniana*) (Riskind and Diamond 1986).

In addition, the 2001 National Land Cover Dataset identifies 15 different land cover types in Hays County, of which forests, shrubland, and grasslands or crop fields are dominant (Table 4-1 and Figure 4-2).

Forested areas cover approximately 42 percent of the county, shrubland vegetation covers approximately 30 percent, and grasslands and crop fields cover approximately 21 percent. The dataset identifies only slightly more than five percent of the county as developed land, primarily associated with the cities of San Marcos, Kyle, Buda, Wimberley, and Dripping Springs, and the Interstate Highway 35 and U.S. Highway 290 corridors.

**Figure 4-2. National Land Cover Dataset 2001 Land Use/Land Cover Classifications for Hays County.**

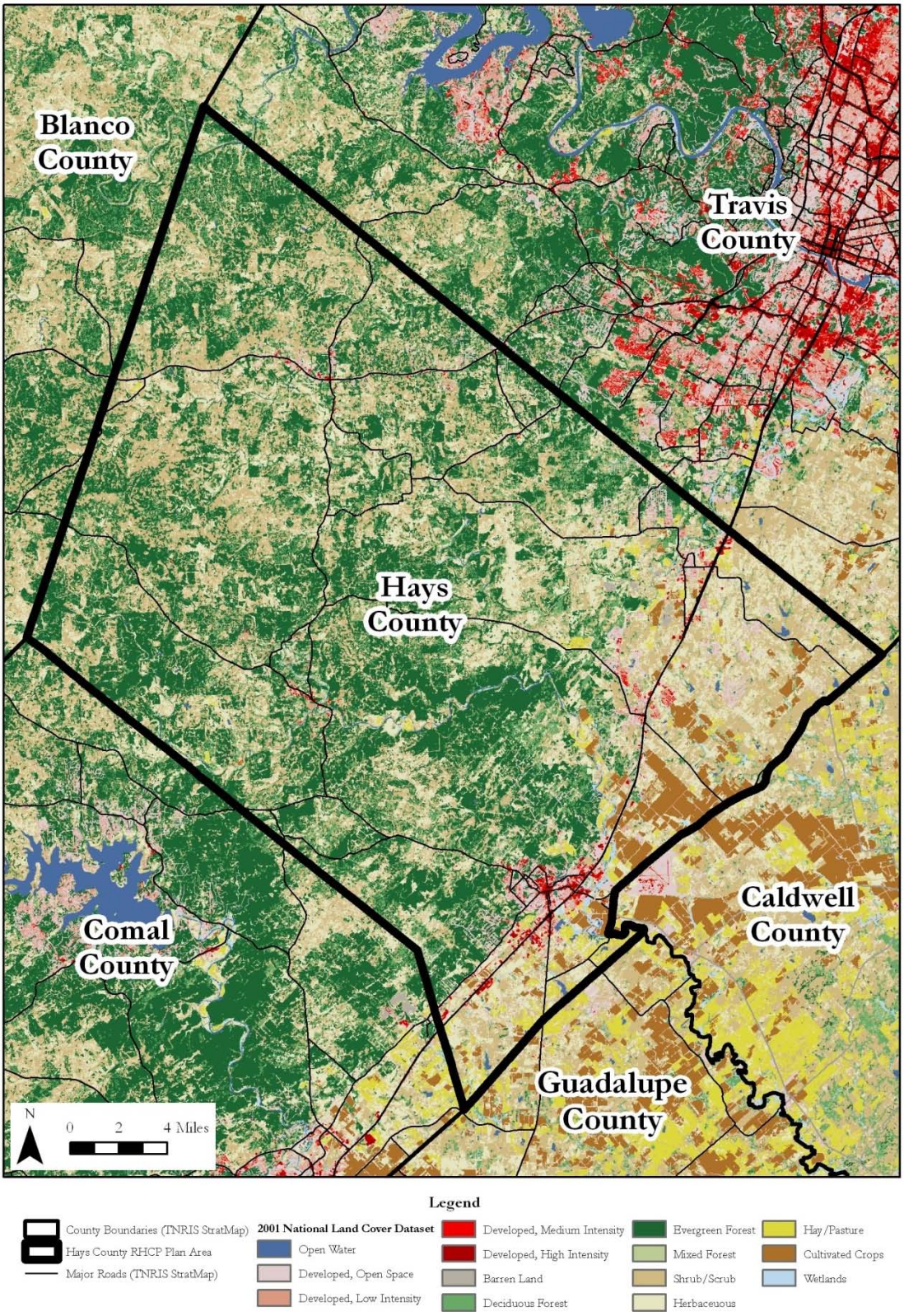


**Table 4-1. 2001 National Land Cover Dataset Land Use/Land Cover Classifications for Hays County.**

| Category | Approx. Area (acres) | Percent of County |
|---|---|---|
| Open Water | 1,901 | 0.4% |
| Developed, Open Space | 15,139 | 3.5% |
| Developed, Low Intensity | 4,877 | 1.1% |
| Developed, Medium Intensity | 2,358 | 0.5% |
| Developed, High Intensity | 1,144 | 0.3% |
| Barren Land | 486 | 0.1% |
| Deciduous Forest | 51,339 | 11.8% |
| Evergreen Forest | 132,510 | 30.5% |
| Mixed Forest | 156 | 0.0% |
| Shrub/Scrub | 130,693 | 30.1% |
| Herbaceous | 75,983 | 17.5% |
| Hay/Pasture | 5,131 | 1.2% |
| Cultivated Crops | 10,512 | 2.4% |
| Woody Wetlands | 2,086 | 0.5% |
| Emergent Herbaceous Wetlands | 3 | 0.0% |

The U.S. Geological Survey identified land use/land cover changes between the 1992 and 2001 versions of the National Land Cover Dataset (USGS 2003). Table 4-2 identifies the changes to major land cover classes in Hays County between 1992 and 2001.

Between 1992 and 2001, Hays County lost approximately 14 percent of its forest cover, with approximately 81 percent of the lost forest cover converted to grassland/shrub cover and approximately 10 percent converted to urban cover.

**Table 4-2. Land use/land cover changes between the 1992 and 2001 versions of the National Land Cover Dataset[1].**

| Land Cover Category | Gain (ac) | Loss (ac) | Net Change (ac) | % Change from 1992 |
|---|---|---|---|---|
| Open Water | 343 | 2 | 341 | 22% |
| Urban | 4,450 | 27 | 4,423 | 23% |
| Barren | 282 | 11 | 271 | 126% |
| Forest | 2,573 | 33,684 | (31,111) | -14% |
| Grassland/Shrub | 28,822 | 4,334 | 24,488 | 13% |
| Agriculture | 2,649 | 1,752 | 897 | 6% |
| Wetlands | 691 | 0 | 691 | 48% |

[1] U.S. Geological Survey. 2003. National Land Cover Database NLCD 1992/2001 Change (edition 1.0). U.S. Geological Survey, Sioux Falls, SD. www.mrlc.gov/multizone.php.

## 4.5 General Wildlife

Inhabiting the vegetation types described above are various wildlife species commonly observed within Hays County and the eastern edge of the Edwards Plateau (Schmidly 2004, Lockwood 2001, Dixon 2000). Table 4-3 provides a list of representative species.

**Table 4-3. Common Wildlife Species of Hays County.**

| Common Name | Scientific Name | Common Name | Scientific Name |
|---|---|---|---|
| **Mammals** (based on Schmidly 2004) | | | |
| Virginia opossum | *Didelphis virginiana* | Hispid pocket mouse | *Chaetopidus hispidus* |
| Nine-banded armadillo | *Dasypus novemcinctus* | | |
| Cave myotis | *Myotis velifer* | Fulvous harvest mouse | *Reithrodontomys fulvescens* |
| Eastern red bat | *Lasiurus borealis* | White-footed mouse | *Peromyscus leucopus* |
| Brazilian free-tailed bat | *Tadarida brasiliensis* | Deer mouse | *Peromyscus maniculatus* |
| Coyote | *Canis latrans* | Northern pygmy mouse | *Baiomys taylori* |
| Common gray fox | *Urocyon cinereoargenteus* | Hispid cotton rat | *Sigmodon hispidus* |
| Ringtail | *Bassariscus astutus* | Southern plains woodrat | *Neotoma micropus* |
| Northern raccoon | *Procyon lotor* | Norway rat | *Rattus norvegicus* |
| Striped skunk | *Mephitis mephitis* | Roof rat | *Rattus rattus* |
| Feral Pig | *Sus scrofa* | House mouse | *Mus musculus* |
| White-tailed deer | *Odocoileus virginianus* | Eastern cottontail | *Sylvilagus floridanus* |
| Eastern fox squirrel | *Sciurus niger* | Black-tailed jackrabbit | *Lepus californicus* |
| **Birds** (based on Lockwood 2001) | | | |
| Gadwall | *Anas strepera* | White-eyed Vireo | *Vireo griseus* |
| Northern Shoveler | *Anas clypeata* | Blue Jay | *Cyanocitta cristata* |
| Green-winged Teal | *Anas crecca* | Western Scrub-Jay | *Aphelocoma californica* |
| Mallard | *Anas platyrhynchos* | Purple Martin | *Progne subis* |
| Lesser Scaup | *Aythya affinis* | Cliff Swallow | *Petrochelidon pyrrhonota* |
| Bufflehead | *Bucephala albeola* | Barn Swallow | *Hirundo rustica* |
| Wild Turkey | *Meleagris gallopavo* | Carolina Chickadee | *Poecile carolinensis* |
| Northern Bobwhite | *Colinus virginianus* | Black-crested Titmouse | *Baeolophus atricristatus* |
| Pied-billed Grebe | *Podilymbus podiceps* | Carolina Wren | *Thryothorus ludovicianus* |
| Double-crested Cormorant | *Phalacrocorax auritus* | Bewick's Wren | *Thryomanes bewickii* |
| Great Blue Heron | *Ardea herodias* | Ruby-crowned Kinglet | *Regulus calendula* |
| Cattle Egret | *Bubulcus ibis* | Blue-gray Gnatcatcher | *Polioptila caerulea* |
| Black Vulture | *Coragyps atratus* | Hermit Thrush | *Catharus guttatus* |
| Turkey Vulture | *Cathartes aura* | American Robin | *Turdus migratorius* |
| Northern Harrier | *Circus cyaneus* | Northern Mockingbird | *Mimus polyglottos* |
| Red-tailed Hawk | *Buteo jamaicensis* | European Starling | *Sturnus vulgaris* |
| Crested Caracara | *Caracara cheriway* | Cedar Waxwing | *Bombycilla cedrorum* |

**Table 4-3. Common Wildlife Species of Hays County.**

| Common Name | Scientific Name | Common Name | Scientific Name |
|---|---|---|---|
| American Kestrel | *Falco sparverius* | Orange-crowned Warbler | *Vermivora celata* |
| American Coot | *Fulica americana* | Yellow-rumped Warbler | *Dendroica coronata* |
| Killdeer | *Charadrius vociferus* | Summer Tanager | *Piranga rubra* |
| Least Sandpiper | *Calidris minutilla* | Spotted Towhee | *Pipilo maculatus* |
| Ring-billed Gull | *Larus delawarensis* | Rufous-crowned Sparrow | *Aimophila ruficeps* |
| Rock Pigeon | *Columba livia* | Chipping Sparrow | *Spizella passerina* |
| White-winged Dove | *Zenaida asiatica* | Field Sparrow | *Spizella pusilla* |
| Mourning Dove | *Zenaida macroura* | Vesper Sparrow | *Pooecetes gramineus* |
| Yellow-billed Cuckoo | *Coccyzus americanus* | Lark Sparrow | *Chondestes grammacus* |
| Eastern screech-owl | *Otis asio* | Savannah Sparrow | *Passerculus sandwichensis* |
| Common Nighthawk | *Chordeiles minor* | White-crowned Sparrow | *Zonotrichia leucophrys* |
| Chuck-will's-widow | *Caprimulgus carolinensis* | Dark-eyed Junco | *Junco hyemalis* |
| Chimney Swift | *Chaetura pelagica* | Northern Cardinal | *Cardinalis cardinalis* |
| Black-chinned Hummingbird | *Archilochus alexandri* | Painted Bunting | *Passerina ciris* |
| Red-bellied woodpecker | *Melanerpes carolinus* | Red-winged Blackbird | *Agelaius phoeniceus* |
| Ladder-backed Woodpecker | *Picoides scalaris* | Eastern Meadowlark | *Sturnella magna* |
| Northern Flicker | *Colaptes auratus* | Great-tailed Grackle | *Quiscalus mexicanus* |
| Eastern Phoebe | *Sayornis phoebe* | Brown-headed Cowbird | *Molothrus ater* |
| Ash-throated Flycatcher | *Myiarchus cinerascens* | House Finch | *Carpodacus mexicanus* |
| Western Kingbird | *Tyrannus verticalis* | Lesser Goldfinch | *Carduelis psaltria* |
| Scissor-tailed Flycatcher | *Tyrannus forficatus* | House Sparrow | *Passer domesticus* |
| Loggerhead Shrike | *Lanius ludovicianus* | | |
| **Reptiles and Amphibians** (based on Dixon 2000) | | | |
| Smallmouth salamander | *Ambystoma texanum* | Eastern collared lizard | *Crotaphytus collaris collaris* |
| Texas salamander | *Eurycea neotenes* | Texas earless lizard | *Cophosaurus texanus texanus* |
| Western slimy salamander | *Plethodon albagula* | Texas spiny lizard | *Sceloporus olivaceus* |
| Couch's spadefoot | *Scaphiopus couchi* | Southern prairie lizard | *Sceloporus undulates consobrinus* |
| Blanchard's cricket frog | *Acris crepitans blanchardi* | Green anole | *Anolis carolinensis* |
| Cope's gray tree frog | *Hyla chrysoscelis* | Ground skink | *Scincella lateralis* |
| Strecker's chorus frog | *Pseudacris streckeri* | Texas spotted whiptail | *Cnemidophorus gularis gularis* |
| Eastern green toad | *Bufo debilis debilis* | Six-lined race runner | *Cnemidophorus sexlineatus sexlineatus* |
| Red-spotted toad | *Bufo punctatus* | Plains blind snake | *Leptotyphlops dulcis dulcis* |
| Texas toad | *Bufo speciosus* | Eastern yellow-bellied racer | *Coluber constrictor flaviventris* |
| Gulf coast toad | *Bufo valliceps valliceps* | Texas rat snake | *Elaphe obsolete lindheimeri* |
| Rio Grande leopard frog | *Rana berlandieri* | Eastern hog-nosed snake | *Heterodon platirhinos* |

**Table 4-3. Common Wildlife Species of Hays County.**

| Common Name | Scientific Name | Common Name | Scientific Name |
|---|---|---|---|
| Bullfrog | *Rana catesbeiana* | Western coachwhip | *Masticophis flagellum testaceus* |
| Great plains narrowmouth toad | *Gastrophryne olivacea* | Diamondback water snake | *Nerodia rhombifer rhombifer* |
| Common snapping turtle | *Chelydra serpentina serpentina* | Rough green snake | *Opheodrys aestivus* |
| Yellow mud turtle | *Kinosternon flavescens flavescens* | Bullsnake | *Pituophis catenifer sayi* |
| Common musk turtle | *Sternotherus odoratus* | Texas brown snake | *Storeria dekayi texana* |
| Ornate box turtle | *Terrapene ornata ornata* | Checkered garter snake | *Thamnophis marcianus marcianus* |
| Red-eared slider | *Trachemys scripta elegans* | Rough earth snake | *Virginia striatula* |
| Guadalupe spiny soft-shelled turtle | *Trionyx spiniferus guadalupensis* | Texas coral snake | *Micrurus fulvius tenere* |
| | | Western diamondback rattlesnake | *Crotalus atrox* |

While many wildlife species are common occurrences in Hays County, several rare species are also known to occur in Hays County. TPWD maintains a list of rare or imperiled wildlife and plants for each Texas county. The TPWD annotated list of rare species for Hays County includes the following wildlife species, as listed in Table 4-4.

**Table 4-4. TPWD Annotated List of Rare Species for Hays County (TPWD 2008a).**

| Common Name | Scientific Name | Federal Status | State Status |
|---|---|---|---|
| **Amphibians** | | | |
| Blanco blind salamander | *Eurycea robusta* | | Threatened |
| Blanco River springs salamander | *Eurycea pterophila* | | |
| San Marcos salamander | *Eurycea nana* | Threatened | Threatened |
| Texas blind salamander | *Eurycea rathbuni* | Endangered | Endangered |
| **Arachnids** | | | |
| Bandit Cave spider | *Cicurina bandida* | | |
| **Birds** | | | |
| American Peregrine Falcon | *Falco peregrinus anatum* | Delisted | Endangered |
| Arctic Peregrine Falcon | *Falco peregrinus tundrius* | Delisted | Threatened |
| Bald Eagle | *Haliaeetus leucocephalus* | Delisted | Threatened |
| Black-capped Vireo | *Vireo atricapilla* | Endangered | Endangered |
| Golden-cheeked Warbler | *Dendroica chrysoparia* | Endangered | Endangered |
| Mountain Plover | *Charadrius montanus* | | |
| Western Burrowing Owl | *Athene cunicularia hypugaea* | | |
| Whooping Crane | *Grus americana* | Endangered | Endangered |
| Zone-tailed Hawk | *Buteo albonotatus* | | Threatened |
| **Crustaceans** | | | |
| A cave obligate crustaean | *Monodella texana* | | |
| Balcones Cave amphipod | *Stygobromus balconis* | | |
| Ezell's cave amphipod | *Stygobromus flagellatus* | | |
| Texas cave shrimp | *Palaemonetes antrorum* | | |

**Table 4-4. TPWD Annotated List of Rare Species for Hays County (TPWD 2008a).**

| Common Name | Scientific Name | Federal Status | State Status |
|---|---|---|---|
| Texas troglobitic water slater | *Lirceolus smithii* | | |
| **Fishes** | | | |
| Fountain darter | *Etheostoma fonticola* | Endangered | Endangered |
| Guadalupe bass | *Micropterus treculii* | | |
| Guadalupe darter | *Percina sciera apristis* | | |
| San Marcos gambusia | *Gambusia georgei* | Endangered | Endangered |
| **Insects** | | | |
| A mayfly | *Procloeon distinctum* | | |
| Comal Springs dryopid beetle | *Stygoparnus comalensis* | Endangered | |
| Comal Springs riffle beetle | *Heterelmis comalensis* | Endangered | |
| Edwards Aquifer diving beetle | *Haideoporus texanus* | | |
| Flint's net-spinning caddisfly | *Cheumatopsyche flinti* | | |
| Leonora's dancer damselfly | *Argia leonorae* | | |
| Rawson's metalmark | *Calephelis rawsoni* | | |
| San Marcos saddle-case caddisfly | *Protoptila arca* | | |
| Texas austrotinodes caddisfly | *Austrotinodes texensis* | | |
| **Mammals** | | | |
| Cave myotis bat | *Myotis velifer* | | |
| Plains spotted skunk | *Spilogale putorius interrupta* | | |
| Red wolf | *Canis rufus* | Endangered | Endangered |
| **Mollusks** | | | |
| Creeper (squawfoot) | *Strophitus undulatus* | | |
| False spike mussel | *Quincuncina mitchelli* | | |
| Golden orb | *Quadrula aurea* | | |
| Pistolgrip | *Tritogonia verrucosa* | | |
| Rock pocketbook | *Arcidens confragosus* | | |
| Texas fatmucket | *Lampsilis bracteata* | | |
| Texas pimpleback | *Quadrula petrina* | | |
| **Reptiles** | | | |
| Cagle's map turtle | *Graptemys caglei* | | Threatened |
| Spot-tailed earless lizard | *Holbrookia lacerata* | | |
| Texas garter snake | *Thamnophis sirtalis annectens* | | |
| Texas horned lizard | *Phrynosoma cornutum* | | Threatened |

## 4.6 Hays County RHCP Covered Species

Two endangered bird species, the golden-cheeked warbler and the black-capped vireo are included in the proposed RHCP as "covered species"; that is, they would be covered by the requested incidental take permit. The following paragraphs summarize the covered species' status, distribution, and habitat requirements. Each species is described in greater depth in Section 3.2 of the Hays County RHCP.

### 4.6.1 Golden-cheeked Warbler

#### 4.6.1.1 Description and Regulatory Status

The golden-cheeked warbler is a migratory bird and the only bird in Texas that nests exclusively within the state's boundaries (Oberholser 1974). The golden-cheeked warbler migrates between wintering grounds in southern Mexico and Central America and breeding grounds on the Edwards Plateau and adjacent areas in central Texas, including Hays County (Ladd and Gass 1999). The species arrives in central Texas in early to mid-March to breed, and migrates south in June or July, with most warblers having left central Texas by early to mid-August (Ladd and Gass 1999, Wahl et al. 1990).

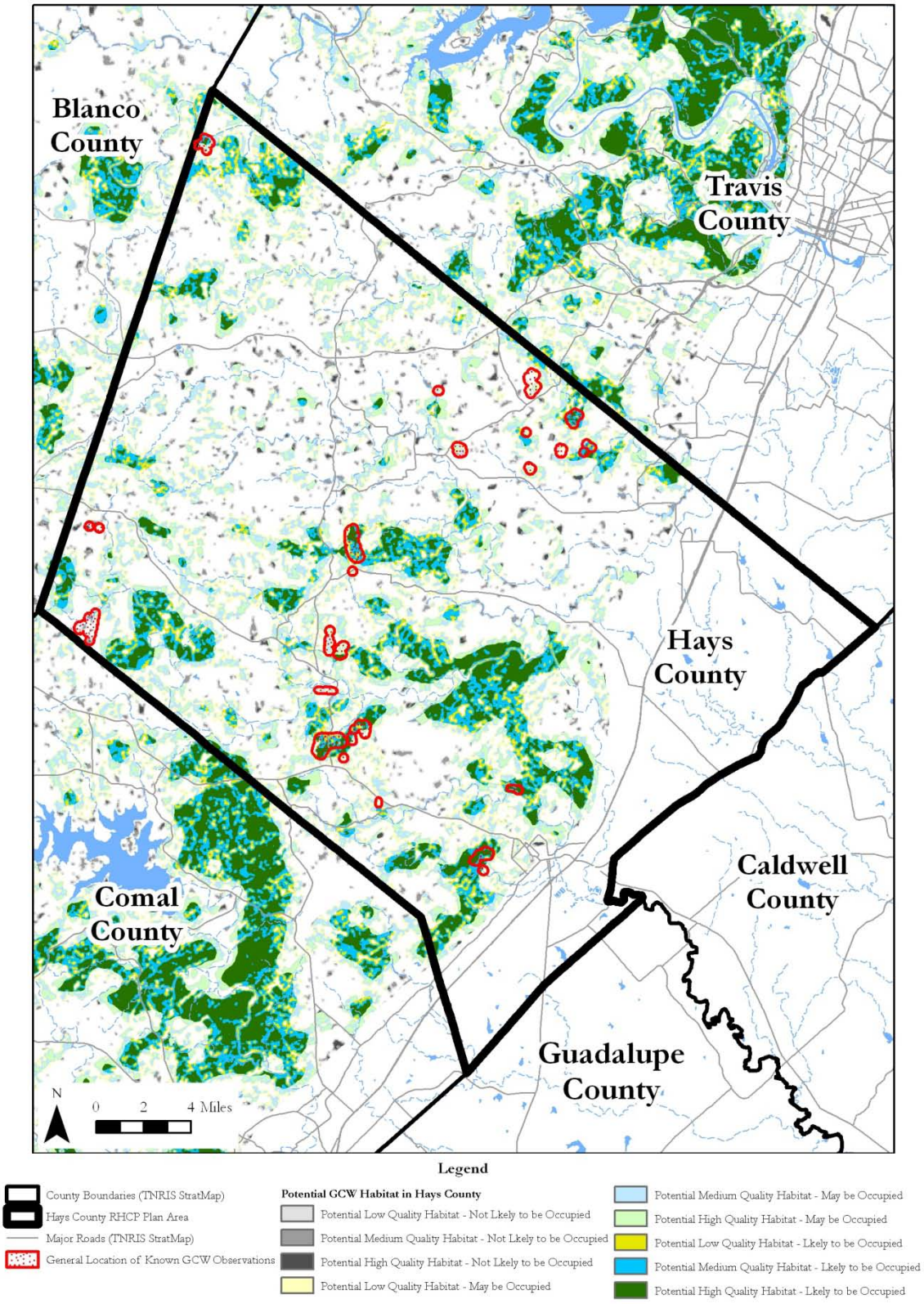
The Service published an emergency listing of the golden-cheeked warbler as endangered on May 4, 1990 (55 FR 18844). On December 27, 1990 the golden-cheeked warbler gained permanent Federal listing status as endangered (55 FR 53153). The Service has not designated critical habitat for the golden-cheeked warbler. TPWD also lists the species as endangered (TPWD 2008a).

Records of golden-cheeked warblers in Hays County are sparse, but available data shows that the species has been recently recorded from across much of the county. Several golden-cheeked warbler localities in Hays County were identified from data provided by the Service, the Texas Natural Diversity Database, and Loomis Partners, Inc. (generalized locations are shown in Figure 4-3. These localities represent golden-cheeked warbler observations recorded by various observers between 1990 and 2005.

#### 4.6.1.2 Habitat Requirements

In Texas, the golden-cheeked warbler is an inhabitant of old-growth or mature regrowth juniper-oak woodlands in the Edwards Plateau, Lampasas Cut-Plain, and Llano Uplift (Pulich 1976, Wahl et al. 1990, USFWS 1992). Golden-cheeked warblers are typically found in areas of steep slopes, canyon heads, draws, and adjacent ridgetops (Pulich 1976, Ladd 1985). Ashe juniper and various oak species are the most common tree species throughout the golden-cheeked warbler's breeding range. The peeling bark of mature Ashe juniper trees is essential for nest building, and deciduous trees (especially deciduous oaks) are important for foraging (Wahl et al. 1990). Golden-cheeked warblers utilize moderate to dense forest or woodland habitat with a high percent canopy cover in the middle and upper layers (Ladd and Gass 1999).

**Figure 4-3. Potential GCW Habitat and Reported Observations in Hays County.**



The golden-cheeked warbler is a slightly forest-interior species (Coldren 1998, DeBoer and Diamond 2006) that also utilizes woodland edges, particularly after young have fledged (Kroll 1980, Coldren 1998). The golden-cheeked warbler appears to be less likely to occupy habitat adjacent to land uses with hard edges and high levels of human disturbance, particularly residential and commercial development (Engels 1995, Coldren 1998), and more likely to occupy habitat patches adjacent to soft edges associated with adjacent agricultural and grassland uses (Coldren 1998). Golden-cheeked warblers also generally placed territories farther from habitat edges with adjacent high-disturbance land uses, such as residential and transportation development (Coldren 1998).

Other habitats utilized by golden-cheeked warblers in central Texas, particularly by fledglings and family groups later in the breeding season, include woodlands and woodland edges with less species diversity, canopy cover, and canopy height. Upland oak savannas and drier, sparser juniper woodlands may also be used later in the breeding season (Ladd and Gass 1999).

#### 4.6.1.3 Habitat Availability in Hays County

The Hays County RHCP identifies approximately 170,355 acres of potential golden-cheeked warbler habitat that may be currently available in the county (approximately 39 percent of the area of the Hays County) (see Section 3.2.1.3 and Appendix A of the RHCP). Of this acreage, approximately 34,110 acres are potential high quality habitat typified by very dense woodland canopy cover. Approximately 69,665 acres are potential medium quality habitat, and approximately 66,580 acres are potential low quality habitat with a relatively open woodland canopy. Much of this potential habitat in Hays County has a fragmented and patchy distribution, with few large blocks of high quality habitat compared with adjacent counties to the north and south.

Not all areas of potential habitat are expected to be used by the species. The Hays County RHCP estimates that approximately 148,638 acres (87 percent) of the potential habitat in Hays County (including potential high, medium, and low quality habitat) has a probability of being occupied by the species (i.e., the habitat occurs in a landscape with at least 40 percent suitable habitat). Only approximately 50,305 acres of potential golden-cheeked warbler habitat mapped in Hays County (30 percent of the total area of potential habitat) has a probability of occupancy that exceeds 50 percent (i.e., the habitat occurs in a landscape with at least 80 percent suitable habitat) (see Section 3.2.1.3 and Appendix A of the RHCP).

Figure 4-3 shows areas of potential golden-cheeked warbler habitat in Hays County, including areas with various quality habitats and probabilities of occupancy. Table 4-5 summarizes the acreage in each habitat quality and occupancy category.

**Table 4-5. Potential Golden-cheeked Warbler Habitat[1] and Occupancy Probability[2] in Hays County.**

| Habitat Class | Total Acres of Potential Habitat | Acres of Potential Habitat Not Likely to be Occupied | Acres of Potential Habitat May be Occupied | Acres of Potential Habitat Likely to be Occupied |
|---|---|---|---|---|
| Potential Low Quality Habitat | 66,580 | 13,969 | 42,193 | 10,419 |
| Potential Medium Quality Habitat | 69,665 | 6,736 | 41,389 | 21,540 |
| Potential High Quality Habitat | 34,110 | 1,013 | 14,751 | 18,346 |
| All GCW Habitat Classes | 170,355 | 21,718 | 98,333 | 50,305 |

[1]Potential habitat and relative quality classes as identified by the Loomis habitat model. See Loomis (2008) in Appendix A of the Hays County RHCP for a discussion of model methodology and results.

[2]Occupancy probabilities based on an analysis of the Loomis habitat model using the methodology described in Magness et al. (2006). See Appendix A of the Hays County RHCP for a discussion of the Magness occupancy model and the occupancy analysis of the Loomis habitat model.

#### 4.6.1.4 Population Estimates

No recent range-wide estimates of the population size of the golden-cheeked warbler are reported in the literature. Estimates of population size in 1962 reported in Pulich (1976) vary from approximately 7,815 pairs to 18,486 pairs, based on Soil Conservation Service surveys of "cedar brakes" and "virgin Ashe juniper" and estimates of the density of golden-cheeked warblers in areas of "average" habitat. Wahl et al. (1990) estimated that the population of golden-cheeked warblers was between approximately 4,822 to 16,016 pairs, based on estimates of forest cover identified from Landsat imagery collected between 1974 and 1981 for a portion of the golden-cheeked warbler range and revised assumptions of golden-cheeked warbler density in potential habitat.

The golden-cheeked warbler was first reported to occur in Hays County in the early 1890's (Pulich 1976). However, Pulich (1976) found that records of the species in Hays County were not numerous, possibly due to a history of land-clearing activity. Current records of golden-cheeked warblers in Hays County are also sparse, but available data show that the species has been recently recorded from across much of the county.

Several golden-cheeked warbler localities in Hays County were identified from available datasets provided by the Service, the Texas Natural Diversity Database, and Loomis (generalized golden-cheeked warbler locations are shown in Figure 4-3). These localities represent golden-cheeked warbler observations recorded by various observers between 1990 and 2005. Each of these recent golden-cheeked warbler localities occur in areas identified as potential habitat by the Loomis golden-cheeked warbler habitat model, including areas identified as potential low or moderate quality habitat and areas with a less than 50 percent probability of occupancy.

Pulich (1976) estimated that the golden-cheeked warbler population in Hays County was approximately 1,500 pairs in 1962 and approximately 150 pairs in 1974. There are no recent

estimates of the total number of golden-cheeked warblers in Hays County reported in the literature.

#### 4.6.1.5 Threats

Most recent researchers have indicated that the population decline of the golden-cheeked warbler is a result of various factors related to habitat destruction and fragmentation (Wahl et al. 1990, USFWS 1992, Ladd and Gass 1999). Oberholser (1974) discussed three main causes for the decline in the amount of suitable habitat: land clearing for agricultural use, land development, and reservoir construction. Of these, land clearing for agricultural use and land development are activities occurring in Hays County. Other factors that may be contributing to the decline of the species include the loss of deciduous oaks in nesting habitat to oak wilt, brood parasitism by brown-headed cowbirds, and predation and competition by urban-tolerant birds, such as blue jays (USFWS 1992).

#### 4.6.1.6 Recovery Plan

The 1992 Golden-cheeked Warbler Recovery Plan (USFWS 1992) identifies the criteria to be met for the golden-cheeked warbler to be considered for downlisting from endangered to threatened status. These recovery criteria include the protection of sufficient breeding habitat to ensure the continued existence of at least one viable, self sustaining golden-cheeked warbler population in each of the eight recovery regions delineated in the recovery plan, where the potential for gene flow exists across regions to ensure long-term viability of the protected populations (USFWS 1992). Hays County lies within Recovery Region 5, which also includes all of Travis County and portions of Williamson, Blanco, and Burnet counties.

Attaining the recovery goals for the golden-cheeked warbler includes the identification of "focal areas" for protection that include a single, viable golden-cheeked warbler population or one or more smaller populations that are interconnected. Within Recovery Region 5, it appears that two focal areas have already largely been protected through the establishment of the Balcones Canyonlands Preserve and the Balcones National Wildlife Refuge in Travis and Burnet Counties.

Hays County lacks the very large, contiguous blocks of potential golden-cheeked warbler habitat that are present in some adjacent counties (i.e., Travis County and, to a lesser extent, Comal County) (Figure 4-3). The potential golden-cheeked warbler habitat in Hays County, while fairly abundant, is distributed in smaller, more isolated patches (Figure 4-3). Therefore, Hays County generally lacks an obvious "focal area" to contribute to the recovery goals for Recovery Region 5. However, achieving the recovery goals for the golden-cheeked warbler also require the protection and management of "abundant and scattered patches of habitat" outside of the focal protection areas (USFWS 1992). Protection of golden-cheeked warbler habitat across Hays County could contribute to the maintenance of adequate connectivity between existing and potential focal areas in Recovery Regions 5 and 6.

A status review of the golden-cheeked warbler is underway, but is currently unavailable.

### 4.6.2 Black-capped Vireo

#### 4.6.2.1 Description and Regulatory Status

The black-capped vireo is a small, migratory, insectivorous bird and is present in Texas during the breeding season. Black-capped vireos arrive in Texas from late March to mid-April, and leave their breeding grounds in the fall, generally by mid-September (USFWS 1991). The present known breeding range of the black-capped vireo extends from central Oklahoma through Dallas, the Edwards Plateau, Concho Valley, Callahan Divide, and Big Bend National Park in Texas to the Mexican states of Nuevo Leon and Tamaulipas. The species winters entirely in Mexico along the Pacific slopes of the Sierra Madre Occidental Mountains from southern Sonora to Oaxaca (Wilkins et al. 2006).

The Service lists the black-capped vireo as endangered. It was first proposed for endangered status on December 12, 1986 (51 FR 44808) and was given endangered status on October 6, 1987, the rule becoming effective on November 5, 1987 (52 FR 37420). However, a recent status review for the black-capped vireo recommended downlisting the status of the species to threatened (USFWS 2007). The Service has not designated critical habitat for the black-capped vireo. The black-capped vireo was state-listed as threatened on March 1, 1987 and endangered on December 28, 1987.

#### 4.6.2.2 Habitat Requirements

The black-capped vireo uses heterogeneous scrub habitat that has a patchy distribution of shrub clumps and thickets with a few scattered trees and abundant deciduous foliage to ground level (Graber 1957, 1961; USFWS 1991; Grzybowski 1995). While the habitats occupied by the black-capped vireo may differ greatly across its range, the most common and distinguishing habitat element throughout the range of the species is the presence and density of low, deciduous foliage at ground level to approximately three meters (USFWS 1991, Grzybowski et al. 1994, Maresh 2005). This low, dense, deciduous cover provides foraging and nesting sites, as well as protective cover from adverse weather and predators (Grzybowski et al. 1994).

Typical plant species in black-capped vireo habitat on the Edwards Plateau include plateau live oak, shin oak, and various sumacs. Less common species include Texas mountain laurel, agarito, and beebrush (*Aloysia gratissima*). Ashe juniper is usually not the dominant species, although it may be co-dominant with the oaks (Graber 1961, USFWS 1991, Grzybowski 1995).

Black-capped vireo habitat may also be associated with certain geologic formations (i.e., Fredericksburg limestones in Texas), poor soils, and topographic features that might create more favorable conditions for maintaining low, patchy, shrublands (USFWS 1991). However, any potential relationships between soils, geology, and black-capped vireo habitat are poorly understood.

In many parts of the black-capped vireo range (including the eastern edge of the Edwards Plateau), the shrubland vegetation used by the species is an early successional vegetation type frequently maintained by fire or moderate browsing by wildlife or livestock (heavy browsing can reduce black-capped vireo habitat). Other land management practices may also create or maintain suitable habitat conditions for the black-capped vireo. In other parts of the species' range, suitable breeding habitat is a stable vegetation type maintained by the abiotic characteristics of the area (Farquhar and Gonzalez 2005).

#### 4.6.2.3 Habitat Availability in Hays County

Due to the importance of vertical deciduous cover as a component of black-capped vireo habitat, the extent of this habitat across the range of the species has been difficult to assess. The best available estimates of black-capped vireo habitat are presented in Wilkins et al. (2006) and are based on habitat identified during a series of county-by-county roadside surveys reported in Maresh and Rowell (2000). However, due to sampling issues associated with the original roadside surveys, the region-wide and county-wide estimates of potential black-capped vireo habitat may not be reliable and are of limited utility (Wilkins et al. 2006). Further, these estimates of available habitat do not include maps showing the distribution of the habitat across the landscape. Wilkins et al. (2006) estimates that approximately 23,855 acres of potential black-capped vireo habitat may be available in Hays County.

#### 4.6.2.4 Population Estimates

Wilkins et al. (2006) tallied the number of known, recently observed black-capped vireo males in Texas (i.e., observations documented since 2000), by county and recovery region, and estimated a total known Texas population size of approximately 6,010 males. The recent known population of black-capped vireos in the proposed black-capped vireo Recovery Region 2 (per USFWS 1996) was 1,018 males (Wilkins et al. 2006).

Graber (1957) identified breeding populations of the black-capped vireo in Hays County in the late 1950's located at the El Rancho Cima Boy Scout Camp and at locations within a couple of miles south and east of Wimberley. Accurate locations for these three historic observations are not available. The Texas Natural Diversity Database maintained by the Texas Parks and Wildlife Department identifies three occurrences of the black-capped vireo in Hays County (one reported in 1993 and the other two reported in 1999) (TPWD 2008a). The Service has not received any records of the species in the county since 2000 (Wilkins et al. 2006).

The current population of black-capped vireos in Hays County is unknown, since a detailed population survey of the county has not been completed and only a few observations of the species have been reported in recent years. However, given the increasingly optimistic status of the black-capped vireo overall (the recent status review proposed that the species be downlisted in part due to the larger number of known populations) (USFWS 2007b), the documented presence of the species on many private lands in the region (USFWS 2007b), and

the likely abundance of potential habitat in the county (Wilkins et al. 2006), the species is still likely to occur in Hays County.

#### 4.6.2.5 Threats

The 2007 status review for the black-capped vireo found that habitat loss and fragmentation due to the conversion of rangeland to other uses has likely decreased the amount of available habitat for the black-capped vireo across Texas, particularly on the Edwards Plateau, and remains a major threat (USFWS 2007b).

The status review found that fewer domestic livestock on the Edwards Plateau, particularly goats, may have decreased the overall threat from grazing and browsing. However, heavy grazing and browsing by domestic livestock may still have an important negative impact on localized black-capped vireo populations. While the density and abundance of domestic livestock on the Edwards Plateau may be decreasing, the populations of white-tailed deer and other exotic, browsing ungulates may have increased, which may be of concern to the species (USFWS 2007b).

Brood parasitism by brown-headed cowbirds has been identified as a major factor in the low reproductive success of some black-capped vireo populations. Cowbird abundance is correlated with the number and proximity of domestic livestock feeding areas, and the relative abundance of cowbirds in Texas has generally been decreasing over the last ten years. In addition to the general decline of the abundance of cowbirds in North America, cowbird trapping and removal efforts are likely to have reduced parasitism rates on many of the managed populations. The status review states that the overall threat to the species from brood parasitism in Texas has likely decreased since the time of listing (USFWS 2007b).

Vegetational succession, particularly the invasion and growth of Ashe juniper into formerly open rangelands, has limited black-capped vireo habitat across much of the range of the species. The status review identifies fire suppression, overgrazing, and drought as contributing factors to the increase of Ashe juniper in the landscape. The status review suggests that vegetational succession may be an increasing threat to the black-capped vireo, but little data is available to quantify the magnitude of the threat (USFWS 2007b).

In addition to the major threats to the species, the status review identifies predation from red-imported fire ants as a potentially increasing threat to the species (USFWS 2007b).

#### 4.6.2.6 Recovery Plan and Status Review

The 1992 Black-capped vireo Recovery Plan is currently considered to be out-of-date and in need of revision (USFWS 2007b), primarily because the known black-capped vireo population is currently much larger than the known population at the time of listing and the relative magnitude of the primary threats to the species is likely to have changed since listing. However, the recovery criteria listed in the 1992 Recovery Plan included a call for the protection

of at least one viable black-capped vireo population composed of at least 500 to 1000 breeding pairs in each of six recovery regions in Texas, Oklahoma, and Mexico.

The Service includes Hays County within the black-capped vireo Recovery Region 3 (USFWS 1991). However, the Black-capped vireo Population and Habitat Viability Assessment Report (USFWS 1996) recommended that Hays County be included in a redrawn Recovery Region 2.

The 2007 status review recommends that the species be down listed from endangered to threatened status (USFWS 2007b). The recommendation for downlisting is based on observations that total known population of black-capped vireos in Texas is much larger than that known at the time of listing due to an increase in the overall population size and/or increased survey efforts that identified populations at new locations (including on private lands). Given a larger known population, the magnitude of the major threats to the species generally less than previously suspected. However, the status review cautions that threats to this species still exist and its recovery depends on the implementation of management actions to reduce these threats (USFWS 2007b).

## 4.7 Hays County RHCP Evaluation and Additional Species

The other special status species addressed in this EIS include the evaluation and additional species addressed in the Hays County RHCP and the other Federal or state listed species with potential occurrence in Hays County. None of these species are proposed for incidental take coverage in the RHCP, but some may benefit from the conservation measures described in the RHCP.

### 4.7.1 Evaluation Species

The proposed Hays County RHCP addresses 40 karst species that are included in the RHCP as "evaluation" species. The 40 evaluation species are listed in Table 1-1. These evaluation species were recommended for inclusion in the RHCP by the Hays County BAT. Each of the evaluation species is currently unlisted; however, the County recognizes that these species may be rare or sensitive and that some may have the potential to become listed species during the duration of the permit. Several of the evaluation species were included in a listing petition that was submitted to the Service in 2007 by the Forest Guardians (now WildEarth Guardians); although some of these petitioned species were recently dismissed by the Service from further review (see Table 4-6).

For the majority of these karst species, little is known of their biology, including breeding, diet, home ranges, microhabitat, demography, behavior, longevity, species associations, or life history. Only a handful of field studies on the karst invertebrates exist (Holsinger and Longley 1980). The known ranges of the evaluation species are limited and all of the species are currently known to occur only in Texas; most are known from fewer than ten localities. Several species are single site endemics that are currently known from only one location in Hays County.

Descriptions, known localities, and habitat requirements (as currently known) for the evaluation species are described in Appendix B and Appendix C of the Hays County RHCP and summarized in Table 4-6 below.

Insufficient information about these species currently exists to support the level of analysis required to meet the ESA issuance criteria for an incidental take permit. Therefore the County is not currently seeking incidental take coverage for these species through the RHCP.

**Table 4-6. Evaluation Species Addressed in the Hays County RHCP[1].**

| Species | Hays County Occurrence | Notes |
|---|---|---|
| | | **TUBELLARIANS** |
| *Sphalloplana mohri* | Artesian Well, Ezell's Cave | The known range of this aquifer flatworm is limited to two localities in Hays County and four other localities in Kendall, Travis, San Saba, and Mason counties (Kenk 1977, Texas Memorial Museum (TMM) Database 2001). |
| | | **MOLLUSKS** |
| *Phreatodrobia micra* | Artesian Well, San Marcos Springs | The flattened cavesnail is an aquifer adapted species known from six localities in three Texas counties: Hays, Comal, and Kendall counties (Hershler and Longley 1986). |
| *Phreatodrobia plana* | Artesian Well, San Marcos Springs | The disc cavesnail is an aquifer adapted species known to occur at three localities in Comal and Hays counties (Hershler and Longley 1986). |
| *Phreatodrobia punctata* | San Marcos Springs | The high-hat cavesnail is known to occur at only two localities; one in Travis County (Barton Springs) and one in Hays County (San Marcos Springs) (Hershler and Longley 1986, TMM database 2001). |
| *Phreatodrobia rotunda* | Artesian Well, San Marcos Springs | The beaked cavesnail is currently known to be endemic to Hays County, with only two known localities (Hershler and Longley 1986, TMM database 2001). |
| | | **HIRUDINEA** |
| *Mooreobdella* n. sp. | Artesian Well, Ezell's Cave, San Marcos Springs, | This cave-obligate leach is one of only two known aquifer-adapted leeches in the world: one is in Romania and the other is in Hays County, Texas (Culver and Sket 2000). Virtually nothing is known about this species and it has not yet been described by taxonomists. The currently known distribution in Texas includes three localities in Hays County (TMM database 2001, R. Gibson pers. comm. to Zara Environmental 2008). |
| | | **CRUSTACEANS** |
| *Tethysbaena texana* | Artesian Well, Diversion Spring, Ezell's Cave | This cave-obligate crustacean is the only species from this rare order of crustaceans that is known from the continental United States. The species is known from seven localities in Bexar, Comal, Hays, and Uvalde counties (Stock and Longley 1981; R. Gibson, pers. comm. to Zara Environmental 2008). |

**Table 4-6. Evaluation Species Addressed in the Hays County RHCP[1].**

| Species | Hays County Occurrence | Notes |
|---|---|---|
| *Allotexiweckelia hirsuta* | Artesian Well | This cave-obligate amphipod is the only member of the genus *Allotexiweckelia*. It is a subterranean species known from three localities in Hays and Bexar counties (Holsinger and Longley 1980, TMM database 2001). |
| *Artesia subterranea* | Artesian Well, Ezell's Cave | There are only two species in the genus *Artesia*, and both occur only in Texas. This cave-obligate amphipod is described from a single locality in Hays County (Holsinger and Longley 1980), but has been identified at three other sites in Hays, Comal, and Val Verde counties (Gibson et al. 2008; R. Gibson pers. comm. to Zara Environmental 2008). Based on the nature of all of these localities, Gibson et al. (2008) suggests that this species primarily inhabits deeper areas of the aquifer. |
| *Holsingerius samacos* | Artesian Well | This cave-obligate amphipod is currently known from a single locality in Hays County (Holsinger and Longley 1980, TMM database 2001). |
| *Seborgia relicta* | Artesian Well, Ezell's Cave | This species is a cave-obligate amphipod known from five localities in Hays, Comal, and Medina counties (Holsinger and Longley 1980, Gibson et al. 2008, Holsinger 1992). |
| *Stygobromus balconis* | Autumn Woods Well, Boyett's Cave | The Balcones Cave amphipod is currently known from four localities, including sites in Hays and Travis counties (Gluesenkamp and Krejca 2007, Hubricht 1943, TMM database 2001, R. Gibson pers. comm. to Zara Environmental 2008). |
| *Stygobromus flagellatus* | Artesian Well, San Marcos Springs, Ezell's Cave, Rattlesnake Cave | The Ezell's Cave amphipod is currently known from six localities in Hays, Comal, and Travis counties (Holsinger 1966, Holsinger 1967, Holsinger and Longley 1980, Gibson et al. 2008). |
| *Texiweckelia texensis* | Artesian Well, Ezell's Cave, San Marcos Springs | This cave-obligate amphipod is known from three localities in Hays County (Holsinger and Longley 1980, R. Gibson pers. comm. to Zara Environmental 2008). |
| *Texiweckeliopsis insolita* | Artesian Well, San Marcos Springs | This cave-obligate amphipod is known from three localities in Hays and Bexar counties (Holsinger and Longley 1980). |
| *Lirceolus smithii* | Artesian Well, Diversion Spring | The Texas troglobitic water slater is currently known to be a Hays County endemic, and is only known from two localities in the county (Bowman and Longley 1976, Gibson et al. 2008). |
| *Calathaemon holthuisi* | Artesian Well, Ezell's Cave | This cave-obligate decapod is a Hays County endemic and is currently known only from Ezell's Cave (TMM database 2001). However, there is an unverified new locality at the Artesian Well (R. Gibson pers. comm. to Zara Environmental 2008). |
| *Palaemonetes antrorum* | Artesian Well, Ezell's Cave, Frank Johnson's Well, Wonder Cave | The Balcones cave shrimp has been recorded from eight localities in Bexar and Hays counties. However, one of the Hays County sites (Wonder Cave) is severely impacted by habitat modification and commercialization, and all recent attempts to find any aquatic fauna there have been unsuccessful. Furthermore, there are two other localities where blind shrimp have been reported but not verified, including Jacob's Well in Hays County and Carson Cave in Uvalde County (TMM database 2001). |

**Table 4-6. Evaluation Species Addressed in the Hays County RHCP[1].**

| Species | Hays County Occurrence | Notes |
|---|---|---|
| | | **ARACHNIDS** |
| *Cicurina ezelli*[2] | Ezell's Cave, Grapevine Cave | This species is a cave-obligate spider and currently known to be a Hays County endemic. The spider is currently known from only two localities in the county (TMM database 2001). |
| *Cicurina russelli*[2] | Boyett's Cave | This cave-obligate spider is currently known to be a Hays County endemic that is known from only one locality in the county (TMM database 2001). |
| *Cicurina ubicki*[2] | Fern Cave, McGlothlin Sink | This species is currently known to be a Hays County endemic that is known from two localities in the county (TMM database 2001). |
| *Eidmannella* n. sp. | Ezell's Cave, McCarty Cave, McGlothlin Sink | This new species of cave-dwelling spider definitively occurs in Ezell's Cave, and possibly also occurs in McCarty Cave and McGlothlin Sink in Hays County (TMM database 2001). The species description will be the ultimate source for information on the biology, taxonomy, and distribution of the species. |
| *Neoleptoneta* n. sp. 1[3] | Burnett Ranch Cave | This new species of cave-dwelling spider is currently known to be endemic to Hays County and is only known from one locality: Burnett Ranch Cave (TMM database 2001). |
| *Neoleptoneta* n. sp. 2[3] | Boyett's Cave | This new species of cave-dwelling spider is endemic to Hays County and is currently known from only one locality in the county (TMM database 2001). |
| *Neoleptoneta* n. sp. eyeless[3] | Katy's Cave | This new species of cave-dwelling spider is endemic to Hays County and is only known from one locality (P. Paquin pers. comm. to Zara Environmental 2007). |
| *Tartarocreagris grubbsi* | Wissman's Sink | This species is a cave-obligate pseudoscorpion and is currently known to be a Hays County endemic. The species has been recorded from only one location in the county (Muchmore 2001, TMM database 2001). |
| *Texella diplospina* | Ladder Cave | This species is a cave-obligate harvestman that is currently known to be a Hays County endemic. The species has only been recorded from a single site in the county (Ubick and Briggs 2004, TMM database 2001). |
| *Texella grubbsi* | Burnett Ranch Cave, Wissman's Sink, Wissman's Sink #2 | This cave-obligate harvestman is known to occur in Hays, Travis, and Burnet counties at seven underground localities and two surface localities in Burnet County (Ubick and Briggs 2004, TMM database 2001). |
| *Texella mulaiki* | Boggus Cave, Ezell's Cave, Fern Cave, Ladder Cave, McCarty Cave, McGlothlin Sink, Michaelis Cave, Tricophorous Cave | This species is a cave-obligate harvestman that occupies relatively deeper portions of the caves than other rare harvestman in Hays County (Ubick and Briggs 1992). The species is known from fifteen localities within Hays and Travis Counties (Ubick and Briggs 1992, Ubick and Briggs 2004, TMM database 2001). |

**Table 4-6. Evaluation Species Addressed in the Hays County RHCP[1].**

| Species | Hays County Occurrence | Notes |
|---|---|---|
| *Texella renkesae* | Ezell's Cave, Maggens Sink Hole | This cave-obligate harvestman is a Hays County endemic that is currently known from only two caves in the county (TMM database 2001). |
| | | **INSECTS** |
| *Arrhopalites texensis* | Grapevine Cave, Wissman's Sink #2 | This species is a cave-obligate springtail that is currently known from seven or eight localities in five counties, including Bandera, Bexar, Hays, Travis, and possibly Williamson counties (TMM database 2001). |
| *Batrisodes grubbsi* | Grapevine Cave | This species is a troglobitic, ant-like litter beetle currently known only from a single cave in Hays County (Muchmore 2001). |
| *Comaldessus stygius* | Fern Bank Springs | The Comal Springs diving beetle is currently known from two localities: Comal Springs (Comal County) and Fern Bank Springs (Hays County) (Gibson et al. 2008). |
| *Haideoporus texanus* | Artesian Well | The Edwards Aquifer diving beetle is known from two localities in Hays and Comal counties (Young and Longley 1976, Gibson et al. 2008). |
| *Rhadine* sp. cf. *austinica* | Dahlstrom Cave, Michaelis Cave | This new species of cave-obligate beetle is a Hays County endemic that is currently known from only two sites (J. Reddell pers. comm. to Zara Environmental 2007, TMM database 2001). |
| *Rhadine insolita* | Grapevine Cave | This cave-obligate beetle is currently known from two localities in Hays and Comal counties (TMM database 2001). |
| *Rhadine* n. sp. eyed | Boyett's Cave | This new species of cave-obligate beetle is a Hays County endemic that is currently known from only a single locality (TMM database 2001). |
| *Rhadine* n. sp. 2 | Ezell's Cave, Lime Kiln Quarry Cave, McCarty Cave | This new species of cave beetle is currently known to be a Hays County endemic and definitively occurs in three caves (J. Reddell pers. comm. to Zara Environmental 2007, J. Krejca pers. coll., TMM database 2001). |
| | | **AMPHIBIANS** |
| *Eurycea pterophila* | Ben McCulloch Springs, Blanco River Spring, Cypress Creek Spring, Fern Bank Springs, Grapevine Cave, Jacob's Well, Rancho Cima Dam Spring, Smith Creek Lower and Upper Springs, Spring 1 mi. SE Signal Hill, Spring 1.5 mi. E Payton | The Blanco River salamander is known to occur in at least three counties (Blanco, Hays, Kendall, and possibly Comal counties), with at least eleven known sites in Hays County (Sweet 1978, Chippindale et al. 2000, D. Hillis pers. comm. to Zara Environmental 2008, J. Krejca pers. comm. to Loomis 2008). Previously thought to be restricted to the Blanco River drainage basin, recent work by Bendick (2006) showed this species also occurs in the Guadalupe River drainage basin. |

**Table 4-6. Evaluation Species Addressed in the Hays County RHCP[1].**

| Species | Hays County Occurrence | Notes |
|---|---|---|
| *Eurycea robusta* | Underneath Blanco River at IH 35 | The Blanco blind salamander is known from a single existing specimen that was collected in 1951 from groundwater in a narrow vertical fissure in the bed of the Blanco River northeast of San Marcos, in Hays County (Potter and Sweet 1981). Russell (1976) provided new information on the distribution of *E. robusta* in relation to hydrogeology, and theorized that although *E. robusta* came from a block of Austin Chalk, that unit is not particularly cavernous and the salamander may have actually come up from cave passages in the underlying Edwards Limestone. This species is state-listed by Texas as threatened. |

[1]Shaded species are included in the Forest Guardians 2007 listing petition. However, *Phreatodrobia rotunda*, *Artesia subterranea*, *Cicurina ezelli*, *Cicurina russelli*, *Cicurina ubicki*, *Texella diplospina*, *Texella grubbsi*, *Texella renkesae*, *Rhadine austinica*, and *Rhadine insolita* were dismissed by the Service from further review (74 FR 419).

[2]Cave spiders, particularly in the genus *Cicurina*, are speciose in central Texas, and four *Cicurina* in Bexar County are Federally listed. In Hays County, there are eleven localities recorded for an unidentified blind *Cicurina* that may represent additional localities for one of these evaluation species, or they may represent an undescribed species. Further collection and identification efforts in the county will most likely change the known distribution of these species drastically.

[3]Cave-dwelling leptonetid spiders include two Federally listed species in the genus *Neoleptoneta*. Hays County has up to three undescribed species in this group that are each only known from a single locality.

Recently, the Service received a petition from the Forest Guardians to list all southwestern species with NatureServe global conservation rankings of G1 or G1G2 (critically imperiled or imperiled on a global scale, typically based on the number of known populations) as Federally threatened or endangered (Forest Guardians 2007). The petition names 9 of the evaluation species (*C. ezelli*, *C. russelli*, *C. ubicki*, *T. diplospina*, *T. grubbsi*, *T. renkesae*, *B. grubbsi*, *R. austinica*, and *R. insolita*); however, the Service dismissed several of these species from further review (74 FR 419). However, many of these evaluation species may still be rare (many are currently known to be endemic only to Hays County).

### 4.7.2 Hays County RHCP Additional Species

The proposed Hays County RHCP addresses a third category of species called "additional species", since the conservation measures described in Section 6 of the Hays County RHCP may collaterally benefit these species. The additional species, as listed in Table 1-1, were identified for inclusion in the RHCP by the Hays County BAT.

Hays County will not seek incidental take authorization for the 16 additional species because the species are either: 1) not likely to be impacted by covered activities; 2) insufficient information is available to adequately evaluate take or impacts and mitigation; and/or 3) Hays County lacks mechanisms to address important threats to the species (such as addressing the amount of water in area aquifers). However, as described for the evaluation species, conservation measures taken under the RHCP for the covered species may collaterally benefit one or more of the additional species. Species placed in this category include several of the currently listed aquatic species, as well as unlisted plants and unlisted aquatic animals.

Brief descriptions of the 16 additional species are provided below.

#### 4.7.2.1 Hill Country Wild-mercury

Hill Country wild-mercury (*Ditaxis aphoroides*, also known as *Argythamnia aphoroides*) is an herbaceous perennial plant that is narrowly endemic to the Edwards Plateau and the southwestern portion of north-central Texas. It grows in shallow to moderately deep sandy or rocky limestone soils, including clays and clay loams over limestone. Hill Country wild-mercury is found on rolling upland terrains in grasslands mixed with live oak woodlands. The species has been historically recorded from Hays County, but Mahler (1988) did not report any currently known populations from the county (Diggs et al. 1999, TPWD 2008a). This plant has a global conservation ranking indicating that the species is imperiled across its entire range with a high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors (NatureServe 2007).

#### 4.7.2.2 Warnock's Coral-root

Warnock's coral-root (*Hexalectris warnochii*), also known as Texas purple-spike) is a native Texas orchid found growing under juniper-oak woodlands on the Edwards Plateau. The species also occurs in the Trans-Pecos regions of Texas. On the Edwards Plateau, the orchid grows in deep leaf litter and humus over rocky limestone soils (Diggs et al. 1999, Liggio and Liggio 1999). Warnock's coral-root has been recorded in Hays County (Liggio and Liggio 1999). The species has a global conservation ranking indicating that the species is vulnerable to extirpation or extinction or may be imperiled across its entire range with a moderate to high risk of extinction due to a restricted range, few populations (often 80 or fewer), recent or widespread and possibly steep declines, or other factors (NatureServe 2007).

#### 4.7.2.3 Canyon Mock-orange

Canyon mock-orange (*Philadelphus ernesti*) is a small, flowering shrub that grows on shaded, limestone outcrops in mesic canyons and along streams on the Edwards Plateau. The species is rare and endemic to the Texas Hill Country, including Hays County (Lynch 1981, TPWD 2008a). Canyon mock-orange has a global conservation ranking indicating that the species is imperiled across its entire range with a high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors (NatureServe 2007).

#### 4.7.2.4 Texas Wild-rice

Texas wild-rice (*Zizania texana*) is an aquatic, perennial grass that is generally three to seven feet long. The plant grows in the swift-moving waters of the upper San Marcos River. Texas wild-rice was federally listed as endangered on April 26, 1978 (43 FR 17910). Critical habitat for Texas wild-rice has been designated at Spring Lake and the headwaters of the San Marcos River to its confluence with the Blanco River (USFWS 1995).

#### 4.7.2.5 Texas Fatmucket

The Texas fatmucket (*Lampsilis bracteata*) is a freshwater mussel occurring in streams and small rivers in the Colorado and Guadalupe river basins (Howells et al. 1996, NatureServe 2007). While the Texas fatmucket has not been recorded from Hays County, it has been found in several adjacent and nearby counties (Howells et al. 1996). However, only five small populations are thought to remain and the current status of three of these populations is questionable due to flood scouring or dewatering (NatureServe 2007). The species has a global conservation ranking indicating that the species is imperiled across its entire range with a high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors (NatureServe 2007).

#### 4.7.2.6 Golden Orb

The golden orb (*Quadrula aurea*) is a freshwater mussel that appears to be restricted to flowing waters ranging from only a few centimeters to over three meters deep with sand, gravel, and cobble bottoms (NatureServe 2007). The golden orb has been recorded from the San Antonio, Guadalupe, Colorado, Brazos, Nueces, and Frio river systems. However, its current distribution is thought to only include the Guadalupe, Nueces, Frio, and San Marcos rivers (Howells et al. 1996, NatureServe 2007). The species has a global conservation ranking indicating that the species is imperiled across its entire range with a high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors (NatureServe 2007).

#### 4.7.2.7 Texas Pimpleback

The Texas pimpleback (*Quadrula petrina*) is a freshwater mussel that utilizes mud, gravel, and sand substrates in large to medium sized rivers that have slow flow rates. The species has been found in sites with less than one meter of water. The Texas pimpleback occurs within the Guadalupe and Colorado river basins. While it has been recorded from the Llano, San Saba, Pedernales rivers, the species is currently known to occur only within the Concho River, Colorado River, and a tributary of the Colorado River in Runnels County (Howells et al. 1996, NatureServe 2007). This species has a global conservation ranking indicating that it is imperiled across its entire range with a high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors (NatureServe 2007).

#### 4.7.2.8 Texas Austrotinodes Caddisfly

Caddisflies are slender, elongated, moth-like insects with a winged, terrestrial adult stage and an aquatic caterpillar-like larval stage. The Texas austrotinodes caddisfly (*Austrotinodes texensis*) has been observed at Fern Bank Springs in Hays County, and appears to be endemic to the karst springs and spring runs of the Edwards Plateau. This species has a global conservation ranking indicating that the species is imperiled across its entire range with a high risk of

extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors (NatureServe 2007).

#### 4.7.2.9 Comal Springs Riffle Beetle

The Comal Springs riffle beetle (*Heterelmis comalensis*) is a very small (1.7 to 2.1 mm long) beetle, elongate with approximately parallel sides, coated with fine hairs, and reddish-brown in color (Bosse et al. 1988). Larvae are up to 10 mm long, with an elongate tubular body. Biologists find adults and larvae of this aquifer species primarily in drift nets or cotton cloth traps at spring upwellings (Gibson et al. 2008). This species is known from two localities: San Marcos Springs in Hays County and Comal Springs in Comal County.

The Comal Springs riffle beetle was Federally listed as endangered on December 18, 1997 (62 FR 66295). Critical habitat was designated at Comal Springs and San Marcos Springs on July 17, 2007 (72 FR 39247). The critical habitat designation in Hays County includes 10.5 acres associated with the surface aquatic habitat at the spring outlets and within Spring Lake (except for the slough portion of the lake that lacks spring outlets) (72 FR 39247).

#### 4.7.2.10 *Procleon* Mayfly

*Procloeon distinctum* is a species of mayfly, which are small to medium-sized insects with a winged adult stage and aquatic immature stage. Larvae of *Procloeon distinctum* have been found in submergent vegetation at the lower reaches of riffles and runs. This species has a global conservation ranking indicating that the species is imperiled across its entire range with a high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors (NatureServe 2007).

#### 4.7.2.11 San Marcos Saddle-case Caddisfly

The San Marcos saddle-case caddisfly (*Protoptila arca*) is a slender, elongated, moth-like insect with a winged, terrestrial adult stage and an aquatic caterpillar-like larval stage. The species appears to prefer swiftly moving and well oxygenated, warm water approximately one to two meters deep. While the species is known to be locally very abundant, it has only been recorded from an artesian well in Hays County (NatureServe 2007, TPWD 2008a). This caddisfly has a global conservation ranking indicating that the species is critically imperiled across its entire range with a very high risk of extinction due to extreme rarity (often five or fewer known populations), very steep population declines, or other factors. (NatureServe 2007).

#### 4.7.2.12 Comal Springs Dryopid Beetle

The Comal Springs dryopid beetle (*Stygoparnus comalensis*) is a slender aquatic beetle, about 3 to 4 mm long, with a thin outer covering and reddish-brown color (Barr and Spangler 1992). Larvae are elongate, cylindrical and yellowish-brown. Originally described only from Comal Springs, the type locality and source of the specific name, Barr (1993) discovered them at a second locality, Fern Bank Springs in Hays County. Biologists find adults and larvae of this

aquifer species primarily in drift nets or cotton cloth traps at spring upwellings (Gibson et al. 2008).

The Comal Springs dryopid beetle was listed as Federally endangered on December 18, 1997 (62 FR 66295). The species is only known to occur at Comal Springs at the headwaters of the Comal River in Comal County and Fern Bank Springs approximately 20 miles northeast of Comal Springs in Hays County (USFWS 1995). Critical habitat was designated for the Comal Springs dryopid beetle at both locations on July 17, 2007. The Fern Bank Springs critical habitat unit includes the aquatic habitat at the spring outlet and a 50-foot wide buffer around the spring outlet that includes adjacent riparian habitat. The total size of the critical habitat area at Fern Bank Springs is 1.4 acres (72 FR 39247).

#### 4.7.2.13 Fountain Darter

The fountain darter (*Etheostoma fonticola*) is a reddish-brown freshwater fish that is typically less than one inch long (USFWS 1995). The Service listed the fountain darter as Federally endangered on October 14, 1970 (35 FR 16047). The species is currently known to occur in Spring Lake and the headwaters of the San Marcos River downstream to approximately the confluence of the Blanco River. The fountain darter is also known to occur throughout the Comal River (USFWS 1995). Critical habitat for the fountain darter is designated at Spring Lake and the headwaters of the San Marcos River to approximately 0.5 mile below the Interstate Highway 35 bridge (USFWS 1995).

#### 4.7.2.14 San Marcos Salamander

The San Marcos salamander (*Eurycea nana*) is a small, slender, light reddish-brown, neotenic salamander (Bishop 1941). It is approximately 4 to 6 mm long, lungless, and retains external gills throughout life. Chippindale et al. (1998) reviewed the history of taxonomic status of the species, and studied allozyme and morphological characteristics to justify the validity as a species. The San Marcos salamander can be distinguished from other central Texas *Eurycea* based on a narrower head, light reddish brown body color and dark eye ring, and allozyme characteristics. The habitat for this salamander consists of spring openings and rocky substrates at Spring Lake and below the dam where there is consistently cool, clean, clear, and flowing water. Moss and algae provide habitat for prey species, including amphipods and shrimp. Population estimates have ranged from 17,000 to 53,000 individuals (USFWS 1995).

The San Marcos salamander was listed as federally threatened on July 14, 1980 (45 FR 47355). The species is only known to occur in and just downstream of Spring Lake. Critical habitat for the San Marcos salamander is designated at Spring Lake and approximately 164 feet downstream from the Spring Lake Dam in the upper reaches of the San Marcos River (USFWS 1995).

#### 4.7.2.15 *Eurycea* Species (Northern Hays County)

*Eurycea* salamanders have been found at four locations in northern Hays and southern Travis County between San Marcos Springs and Barton Springs: Blowing Sink Cave and Cold Springs in Travis County and Stuart Springs (also known as "Springs on Little Bear Creek" and as "Taylor Springs" as per Bendick [2006]) and Spillar Ranch Springs in Hays County. These populations share genetic similarity with the San Marcos salamander (*Eurycea nana*) (Bendick 2006), yet are morphologically aligned with the Barton Springs salamander (*Eurycea sosorum*). Both the San Marcos salamander and the Barton Springs salamander are federally listed species. The presence of these *E. nana* populations outside of the San Marcos Springs complex is a preliminary finding and based on a limited sample size (Bendick 2006), and this finding is not yet well documented in technical literature or addressed by regulatory entities (i.e., the Service). However, the most likely outcome of this documentation is that within the next five years biologists will describe these populations as a range extension for the federally listed San Marcos salamander or Barton Springs salamander. Estimates of the number of salamanders at these four sites are not available. Overall, the very low densities at all known localities suggest population numbers that are quite low. As with other *Eurycea* species, these populations probably rely on consistently clean flowing water and substrates that sustain prey species (crustaceans).

#### 4.7.2.16 Texas Blind Salamander

The Texas blind salamander (*Eurycea rathbuni*) is an unpigmented, fully aquatic, large (up to 13 cm long) cave-adapted salamander distinguishable from other central Texas *Eurycea* by the lack of pigment that leaves it with a pearlescent color, extremely broad and flattened head shape, long spindly arms, deeply finned tail, and extremely reduced eyes visible as two small dark spots beneath the skin.

As the largest aquifer organism in Hays County, it is the top predator, feeding on aquifer invertebrates, including crustacea and snails (Longley 1978). A recent study summarized historic qualitative population estimates and used mark-recapture techniques to estimate current populations. At one site the population ranged from 10 to 93 individuals, and densities were recorded at two sites as $0.0026/m^2$ and $2.08/m^2$ (Gluesenkamp and Krejca 2007). Russell (1976) provides a summary of the distribution of the species, including a discussion of geology.

The species is a Hays County endemic, recorded from a small geographical cluster of eight sites: Diversion Spring, Ezell's Cave, Johnson's Well, Primer's Well, Rattlesnake Cave, Side seeps in Sessom's Creek, Artesian Well, and Wonder Cave. The Wonder Cave locality is severely impacted by habitat modification and commercialization and all recent attempts to find any aquatic fauna there have been unsuccessful.

The Texas blind salamander was listed as federally endangered on March 11, 1967 (32 FR 4001). No critical habitat has been designated for the Texas blind salamander (USFWS 1995).

## 4.8 Other Special Status Species

In addition to the Hays County RHCP covered species, evaluation species, and additional species discussed above, TPWD (2008a) identifies nine Federal or state protected wildlife species as having the potential to occur in Hays County. These "special status" species and their regulatory status are listed in Table 4-7 and discussed briefly below.

**Table 4-7. Other species in Hays County with Federal or state protected status.**

| Species | Federal Status | Texas State Status |
|---|---|---|
| **Birds** | | |
| American peregrine falcon (*Falco peregrinus anatum*) | Delisted | E |
| Arctic peregrine falcon (*Falco peregrinus tundrius*) | Delisted | T |
| Bald eagle (*Haliaeetus leucocephalus*) | Delisted | E |
| Whooping crane *(Grus americana*) | E | E |
| Zone-tailed hawk (*Buteo albonotatus)* | | T |
| **Reptiles** | | |
| Cagle's map turtle (*Graptemys caglei*) | | T |
| Texas horned lizard (*Phrynosoma cornutum*) | | T |
| **Fish** | | |
| San Marcos gambusia (*Gambusia georgei*) | E | E |
| **Mammals** | | |
| Red wolf (*Canis rufus*) | E | E |

Key: E = Endangered, T = Threatened

### 4.8.1 American Peregrine Falcon

The American peregrine falcon (*Falco peregrinus anatum*) nests on mountain cliffs and river gorges which generally exceed 200 feet in height (Campbell 2003). The species is an uncommon to rare migrant throughout the state, and is a rare to very rare winter resident occupying primarily urban areas, inland to north-central Texas (Lockwood and Freeman 2004). The American peregrine falcon is a year-round resident in the Trans-Pecos with breeding populations confined to the Guadalupe and Chisos Mountains and the cliffs that line the Rio Grande, but may appear in Hays County as a migrant (Campbell 2003). Fall migrants are noted around the state as early as mid-July, and spring birds may linger as late as early May (Lockwood and Freeman 2004).

The species was listed as a Texas endangered species in 1974, but was removed from the Federal List of Endangered and Threatened Wildlife in August 1999 (64 FR 46541).

### 4.8.2 Arctic Peregrine Falcon

The Arctic peregrine falcon (*Falco peregrinus tundrius*) is slightly smaller in size and lighter in color than the American peregrine falcon (Campbell 2003). It is an uncommon to rare migrant throughout the state, and is a locally uncommon winter resident on the Coastal Prairies,

but can be common at times along the intermediate coast, particularly near bays and estuaries (Lockwood and Freeman 2004). Like the American peregrine falcon, the arctic peregrine falcon may appear in Hays County as a migrant (Campbell 2003). Fall migrants are noted as early as mid-July, and spring birds may linger as late as early May (Lockwood and Freeman 2004).

This species was listed as a Texas endangered species in May 1975, and was reclassified as a threatened species in March 1987. The falcon was removed from the Federal list of endangered and threatened wildlife in October 1994 (59 FR 50796).

### 4.8.3 Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is found year-round in Texas, and the Texas population includes both breeding populations and winter residents. Breeding populations are typically found in the eastern half of the state and along the Texas Gulf Coast; however the species has been known to breed at some localized sites in central Texas. Most wintering populations have been observed in the Texas Panhandle and the central and eastern portions of the state. Spring and fall migrants are also found throughout the state (Campbell 2003). Hays County lacks large bodies of open water that would be suitable for nesting or wintering bald eagles.

The bald eagle is a Texas threatened species, but it was removed from the Federal list of endangered and threatened wildlife in July 2007 (72 FR 37346). The species will be monitored by the Service, in cooperation with the states for a minimum of five years after delisting, pursuant to the Endangered Species Act. The species is still protected by the Bald and Golden Eagle Protection Act (16 USC 668-668d), which prohibits "take" of bald and golden eagles and provides a statutory definition of "take" that includes "disturb."

### 4.8.4 Whooping Crane

The whooping crane (*Grus americana*) is a migratory bird that winters along the Texas coast. The coastal wintering grounds are dominated by salt grass (*Distichlis spicata*), saltwort (*Batis maritima*), smooth cordgrass (*Spartina alterniflora*), glasswort (*Salicornia* sp.), sea ox-eye (*Borrichia frutescens*), and Gulf cordgrass (*Spartina spartinae*). During migration, whooping cranes are known to utilize a variety of habitat types, including freshwater marshes, wet prairies, inland lakes, upland grain fields, and riverine systems (Campbell 2003). Migration occurs throughout the central portion of the state, to the central coast during October-November and again in April (TPWD 2008b). The portion of Hays County over the Edwards Plateau lacks extensive wetlands, major river systems, and abundant crop fields. Therefore, whooping cranes are highly unlikely to use the area during migration.

The whooping crane was Federally listed as endangered in June 1970 (35 FR 8491). Critical habitat for the species was designated in May 1978 (43 FR 20938) and includes wintering range in the Aransas National Wildlife Refuge and vicinity of the Texas Gulf coast.

### 4.8.5 Zone-tailed Hawk

The zone-tailed hawk (*Buteo albonotatus*) is an uncommon local summer resident in the mountains of the central Trans-Pecos, east through the southern Edwards Plateau, and a rare winter resident from Tom Green and Irion Counties southward to east-central Texas. Numerous records of occurrence exist from Bell, Bastrop, Bexar, Colorado, and Victoria counties, although there is no consistent wintering area east of the Balcones Escarpment (Lockwood and Freeman 2004). The zone-tailed hawk occupies arid open country, including open deciduous or pine-oak woodland, mesa or mountain county, often near watercourses, and wooded canyons and tree-lined rivers along middle-slopes of desert mountains. The species utilizes various habitats and sites for nesting, ranging from small trees in lower desert, giant cottonwoods in riparian areas, to mature conifers in high mountain regions (TPWD 2008b).

The species is listed as threatened by the State of Texas.

### 4.8.6 Cagle's Map Turtle

Cagle's map turtle (*Graptemys caglei*) is a small, emydine, aquatic turtle measuring from three to eight inches long. Cagle's map turtle only occurs within the watersheds of the Guadalupe River basin of eleven counties in Texas: Bexar, Blanco, Comal, Dewitt, Gonzales, Guadalupe, Hays, Kendall, Kerr, Lavaca, and Victoria counties (Dixon 2000). According to Vermersch (1992), it may be the most common species of aquatic turtle in Dewitt County, but may now be extirpated in the San Antonio drainage of the Guadalupe River. It is known to occur upriver to the Kerrville area in Kerr County, but its distribution across the Edwards Plateau is poorly documented (Simpson and Rose 2007). Turtles were caught on the Blanco River in Hays County in 2003. However, the density of the species in the Blanco River is thought to be low and the turtles are probably restricted to areas where deep pools provide suitable habitat during drought. Basking and nesting sites may also be limiting habitat features in the Blanco River.

Cagle's map turtle was listed in Texas as a threatened species on November 16, 2000 by the Texas Parks and Wildlife Department (Texas Register, Title 31, Chapter 65). On April 8, 1991, the Cagle's map turtle was petitioned to be listed as a federally endangered species (Killebrew 1991). The Service announced on January 22, 1993, that listing of Cagle's map turtle was warranted, but precluded (USFWS 1993). However, on September 12, 2006, the Service announced that because of stable population size, increased protection, and no foreseeable threats from reservoir construction, the listing of Cagle's map turtle was not warranted (USFWS 2006). Cagle's map turtle is currently classified by the International Union for Conservation of Nature (IUCN) Red List as "vulnerable" (Tortoise & Freshwater Turtle Specialist Group 1996).

### 4.8.7 Texas Horned Lizard

The Texas horned lizard (*Phrynosoma cornutum*) is a flat-bodied lizard with numerous prominent horns on its head and two rows of fringed scales along each side of the body. It

occupies habitats typically of flat open terrain with sparse plant cover; often found in areas of sandy, rocky, or loamy soils (Conant and Collins 1991). The Texas horned lizard has been reported throughout the majority of Texas, including Hays County (Dixon 2000).

The species is listed as threatened by the State of Texas.

### 4.8.8 San Marcos Gambusia

The San Marcos gambusia (*Gambusia georgei*) is a small, live-bearing, freshwater fish. It was endemic to Hays County, formerly known from the upper San Marcos River. The species was restricted to shallow, quiet, mud-bottomed shoreline areas without dense vegetation in a thermally constant main channel (TPWD 2008b).

The species was Federally listed as an endangered species in July 1980 (45 FR 47355-47364). Critical habitat for the species was also designated in 1980, and includes Spring Lake and its outflow, and the San Marcos River system downstream approximately 0.5 miles below the Interstate Highway 35 bridge (45 FR 47355-47364).

The San Marcos gambusia has not been observed since 1983 and after intensive surveys in 1990 failed to locate any individuals of the species, it is now thought to be extinct (USFWS 1995).

### 4.8.9 Red Wolf

The red wolf (*Canus rufus*) was historically known throughout the eastern half of Texas, within brushy and forested areas, as well on coastal prairies (Schmidly 2004). The species was first listed as federally threatened with extinction on March 11, 1967 (32 FR 4001) and is currently listed as federally endangered. This species has been extirpated from Texas, and is no longer known to occur in the state. The only known wild population of the species is on the Albemarle Peninsula of northeastern North Carolina (USFWS 2007c),

## 4.9 Socioeconomic Resources

Hays County is situated along the Interstate Highway 35 corridor between the major population centers of Austin and San Antonio. Hays County is included in the Austin-Round Rock Metropolitan Statistical Area (MSA), which also includes Bastrop, Caldwell, Travis, and Williamson counties.

### 4.9.1 Population Trends

The Austin-Round Rock MSA had an estimated population of nearly 1.6 million in 2007, which is an increase of approximately 44 percent since 1997. Population growth in these counties over the past decade has outpaced population growth of all other Texas MSAs and for the state overall. Comparatively, population growth in Texas was approximately 21 percent between 1997 and 2007 (RECenter 2008a).

Hays County has been the second fastest growing county in the Austin-Round Rock MSA, with an estimated 64.7 percent population growth between 1997 and 2007 (RECenter 2008a).

The 2000 Census reported a population of 97,589 in Hays County. The current population of Hays County, estimated for January 1, 2007 by the Texas State Data Center, was approximately 137,940 (Texas State Data Center 2007). This represents an estimated 41 percent increase in the population of Hays County since the 2000 census (Table 4-8).

**Table 4-8. Census 2000 Population and Estimated 2007 Population in Hays County and Local Communities.**

| Community | Census 2000 Population | Estimated 2007 Population[1] | Percent Change |
|---|---|---|---|
| Hays County | 97,589 | 137,940 | 41% |
| Bear Creek | 360 | 400 | 11% |
| Buda | 2,404 | 5,339 | 122% |
| Dripping Springs | 1,548 | 1,962 | 27% |
| Hays | 233 | 243 | 4% |
| Kyle | 5,314 | 23,285 | 338% |
| Mountain City | 671 | 745 | 11% |
| Niederwald | 584 | 498 | -15% |
| San Marcos | 34,733 | 48,997 | 41% |
| Uhland | 386 | 456 | 18% |
| Wimberley | 3,797 | 4,386 | 16% |
| Woodcreek | 1,274 | 1,476 | 16% |

[1]Estimated 2007 populations reported by the Texas State Data Center (2007).

As shown in Table 4-8, San Marcos is the largest community in Hays County. However, the fastest growing communities in the county are the cities of Buda and Kyle, which are located along the Interstate Highway 35 corridor between San Marcos and Austin.

The approximate population within the portion of Hays County west of Interstate Highway 35 (i.e., the area containing potential habitat for the covered species) was approximately 59,754 in 2000 (approximately 61 percent of the Hays County population in 2000).

### 4.9.2 Employment and Economic Trends

Over the past decade (between 1997 and 2007), non-farm employment in the Austin-Round Rock MSA grew by approximately 191,000 jobs, a change of nearly 35 percent. State-wide, job growth was approximately 20 percent. In 2007, job growth in the Austin-Round Rock MSA outpaced growth in Texas overall, 5.2 percent compared to 3.0 percent (RECenter 2008a). Unemployment (as a percentage of the total labor force) in the Austin-Round Rock MSA was approximately 3.6 percent in 2007, which increased from an unemployment rate of approximately 3 percent in 2000 (Bureau of Labor Statistics 2008a).

The state and national economies are important drivers of the short-term economic outlook for the Austin-Round Rock MSA. According to the Biennial Revenue Estimate (2008-2009) prepared by the Texas Comptroller of Public Accounts (2007), the economic outlook for Texas is generally positive, but several national trends in interest rates, housing markets, and oil prices could lead to significantly lower state economic growth over the next several years. Despite bleak national economic trends, Texas continues to outperform the nation as a whole (and most other states) in a number of economic indicators that should provide some resistance to recessionary conditions (Texas Comptroller of Public Accounts 2008). More recent reporting by the RECenter indicated that Texas economy is "cooling" but continues to create more jobs (Anari and Dotzour 2009). Texas gained 154,600 jobs from December 2007 to December 2008, while the U.S. economy lost more than 2.8 million jobs over the same period. The state's seasonally adjusted unemployment rate rose from 4.2 percent in December 2007 to 6 percent in December 2008, while the U.S. rate rose from 4.9 percent to 7.2 percent during the same period (Anari and Dotzour 2009).

Net migration to Texas and the Austin-Round Rock MSA has also been and will likely continue to be an important factor in the economic growth of the region (Murdock et al. 2002).

The U.S. Bureau of Labor Statistics reported that the size of the average annual labor force in Hays County during 2007 was approximately 71,618 workers. Since 1997, the size of the county's labor force has increased by 23,525 workers (an approximately 49 percent increase). The average annual unemployment rate for Hays County in 2007 was approximately 3.6 percent, which is lower than the County's mean average annual unemployment rate for the period between 1997 and 2007 (approximately 4.1 percent) (Bureau of Labor Statistics 2008b). However, the unemployment rate in Hays County for September 2008 was approximately 4.7 percent (Texas Workforce Commission 2008).

Approximately 51 percent of the Hays County labor force in 2000 worked within Hays County, and approximately 40 percent of the labor force commuted to work into neighboring Travis County (Texas Workforce Commission 2008).

Hays County's local employment base included approximately 43,506 non-state government jobs in 2007, and has expanded in recent years by adding nearly 17,000 jobs since 1997 (an expansion of approximately 64 percent). The largest non-state government employment sectors in Hays County during the fourth quarter of 2007 were in the Trade, Transportation, and Utilities industry; Local Government; and the Leisure and Hospitality industry (Texas Workforce Commission 2008).

According to the Bureau of Economic Analysis, the per capita personal annual income in Hays County was $27,860 in 2006 (the most recent data available), which was lower than the 2006 per capita personal annual income for Texas (approximately $35,116) (Bureau of Economic Analysis 2008). Per capita personal income in Hays County has increased by approximately 49 percent since 1996 (Bureau of Economic Analysis 2008).

### 4.9.3 Housing Trends

Permits for construction projects can also demonstrate land use trends. Building permits issued for single-family residential construction in Hays County increased from approximately 157 permits issued in 1997 to approximately 1,527 permits issued in 2007. Between 1997 and 2007, approximately 12,597 building permits were issued for single-family residences in Hays County. Building permits for new multi-family residences in Hays County have authorized the construction of an average of 48 dwelling units per year for small projects (i.e., two- to four-family dwellings) and an average of 436 dwelling units per year for large projects (i.e., dwellings housing more than four families). Between 1997 and 2007, approximately 5,317 multi-family dwelling units were permitted in Hays County (RECenter 2008b).

As described in Section 4.2.2 of the Hays County RHCP, TXP and Capitol Market Research used Hays County census tract population forecasts, estimates of the projected number and average size of new residences needed to support the projected population increase, and the estimated area of other new commercial, industrial, and institutional projects to estimate the amount new land development that could be associated with projected population increases in Hays County during the duration of the plan (TXP and Capitol Market Research 2008). Based on this analysis, approximately 48,095 acres of land in Hays County may be converted from undeveloped land uses to developed land uses during the duration of the plan. As described in Section 5.2 of the Hays County RHCP, additional impacts to undeveloped lands may occur in relation to the construction or improvement of roads and other public infrastructure that support the projected increase in private-sector land development. For the purposes of this RHCP, the extent of public sector land development is assumed to add another 9,600 acres of developed land to Hays County during the term of the Permit.

The U.S. Census Bureau's 2005-2007 American Community Survey estimates that the average household size in Hays County was 2.86 people. The average value of a new single-family dwelling in Hays County during 2007 was approximately $135,700, which is an increase of approximately 90 percent from 1997 when the average value of a new single-family home was approximately $71,400 (RECenter 2008b).

### 4.9.4 Hays County Finances

The Fiscal Year (FY) 2009 budget adopted by Hays County identifies estimated revenues and expenditures from the County's Operating Funds, Debt Funds, and Construction Funds. Estimated revenues for all three funds in FY2009 total approximately $100,143,353 and estimated expenditures total approximately $116,545,381, with approximately $42,985,622 estimated as a beginning balance for these funds.

FY2009 General Operating Funds have an estimated beginning balance of approximately $22,200,000, with estimated FY2009 revenues of approximately $50,550,540 and expenditures of approximately $53,181,295. The FY2009 General Operating Fund budget

accounts for approximately 65 to 70 percent of the total estimated County budget. County services provided for through the General Operating Fund include operation of the County's administrative offices (such as the commissioners, auditor, treasurer, grants, probation, election administration, and tax assessor/collector offices), community services (such as indigent care, civic center operation, veterans services, and the historical commission), public health and safety services (such as operation of county departments and offices for public safety, environmental health, sheriff, fire, and animal control; operation of the County jail; and emergency medical services), judicial services (including judges, clerks, justices of the peace, attorneys, and operation of the courts), and general county operating services (such as human resources, building maintenance, and information technology services).

County revenues come primarily from ad valorem property taxes. The total Hays County ad valorem tax rate that was approved as part of the FY2009 budget is $0.4550, with an itemized tax rate of $0.3061 dedicated for generating revenue for general county maintenance and operations. Other itemized tax rates contributing to the total include a tax rate of $0.0688 for county debt service and $0.0801 for road and bridge purposes. The estimated property tax revenues for FY2009 general county maintenance and operations, as estimated by the Hays County Auditor in the September 25, 2008 Revenue Approval Worksheet accompanying the approved FY2009 budget, are approximately $29,796,509. The estimated FY2009 general county maintenance and operations property tax revenues are approximately 21 percent greater than the revenues generated during FY2006.

Hays County voters have passed two general obligation bond packages in recent years to fund conservation, recreation, and transportation projects in the county. In 2006, the voters approved the issuance of $30 million of Hays County bonds for parks, natural areas, open space, and related projects, and the preservation of water quality, aquifer recharge areas, and wildlife habitat, and the levying of a tax in payment thereof. On July 8, 2008 the Hays County Commissioners' Court voted to set aside $13 million in bond funds from the May 2006 Parks and Open Space bond program of for the acquisition of property with "recharge land, habitat for endangered species, open space and access to major waterways."

In November 2008, voters also approved a proposition for Hays County to issue $207 million in road bonds for roadway safety and mobility improvements across the County. The road bonds would be paid back by Hays County tax dollars and also by reimbursement from the State of Texas of up to $133 million available through the Texas Department of Transportation (TxDOT) Pass-Through Funding program.

### 4.9.5 Endangered Species Act Compliance Burden

There are a large number of federally listed endangered species that are known to occur in central Texas, especially in the counties located along the Balcones Escarpment. As such, it is relatively common for the proponents of development projects (including both public and private endeavors) to expend significant financial resources and experience substantial project

delays when seeking ESA compliance. It is not unusual for individual incidental take permits to cost tens of thousands to hundreds of thousands of dollars in legal and consultation fees to verify the presence or absence of listed species on a property, negotiate levels of take and mitigation with the Service, draft a habitat conservation plan, complete preliminary NEPA documentation on behalf of the Service, and submit a permit application to the Service. It can take up to two years to prepare and process an individual permit request and issue a permit. In addition to the costs associated with preparing the application documents and waiting for permit issuance, the project proponent must also assume the costs of implementing the agreed upon mitigation measures.

The landowner is not the only entity affected economically during the processing of incidental take permits. With each application for an incidental take permit, the Service is required to devote significant personnel time to negotiate and process individual Section 10(a)(1)(B) incidental take permits, including compliance with NEPA and by completing internal ESA Section 7 consultations. As reported in the final Environmental Impact Statement for the Williamson County Regional Habitat Conservation Plan (issued August 15, 2008), the Service estimates that it dedicates one-quarter to one-half of a full-time-equivalent staff position per year for each consultation.

# 5.0 ENVIRONMENTAL CONSEQUENCES

## 5.1 Assessment of Impact

### 5.1.1 Types of Impact

Each of the four alternatives identified in Section 3 of this EIS have been evaluated for potential effects on the issue topics (resources) described in Section 4. For each resource, effects are identified as being direct, indirect, beneficial, or adverse. These terms are defined below and are based on the controlling definitions for terms under CEQ's NEPA regulations (40 CFR 1508):

- Direct effect: An impact that occurs as a result of the proposed action or alternative in the same place and at the same time as the action.
- Indirect effect: Impacts that are caused by the proposed action or alternative and are later in time or farther removed in distance than the action, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.
- Beneficial effect: A positive change in the condition or appearance of the resource or change that moves the resources toward a desired condition.
- Adverse effect: A change that moves the resource away from a desired condition or detracts from its appearance or condition.

The significance of an impact, as assessed in NEPA analyses, requires consideration of both the context and intensity of the impact (40 CFR 1508.27). In this EIS, the context for the analysis is provided initially by a bulleted list of what could constitute a "significant" impact to that resource, based on the considerations identified in NEPA regulations (40 CFR 1508.27) and professional judgment. The context of the assessment is then expanded upon in the narrative. The level of intensity of an impact is expressed as negligible, minor, moderate, or major. Because the level of intensity definitions vary by impact topic, these definitions are provided separately for each topic near the beginning of the corresponding subsections.

Following the resource-by-resource analyses of direct and indirect impacts, this section presents analyses of cumulative impacts, unavoidable adverse impacts, irreversible and irretrievable commitment of resources, and short-term use of the environment vs. long-term productivity.

### 5.1.2 Assumptions Underlying the Impact Analysis

For the impact analysis in this EIS, the No Action alternative is defined as the conditions that can be expected if the Service does not implement the Proposed Action (issuance of an incidental take permit and approval of the proposed Hays County RHCP) or one of the other action alternatives. Consistent with the CEQ's description of the No Action alternative (46 FR 18026), under No Action the existing trends for land development activities and compliance with the ESA in Hays County are assumed to continue for the next 30 years (the duration of the plan) (i.e., there would be "no change" from the current direction or intensity of existing trends) and the proposed activity (implementation of a regional HCP in Hays County under the authority of an incidental take permit) would not take place.

A regional HCP in Hays County would not constitute a new Federal program authorizing new activities with potential impacts to the human environment. Rather, it would provide a voluntary, alternative means of compliance with the ESA for non-Federal entities in Hays County. This means that project proponents in Hays County will have the ability to develop their property and remain in compliance with the ESA through means other than a regional HCP (i.e., through avoidance, individual HCPs, or ESA Section 7 consultations). Project proponents might also determine that compliance with the ESA is not necessary for their project and develop their property without coordination with the Service (in some cases possibly risking violation of Section 9 of the ESA).

Participation in a regional HCP by the proponents of projects in Hays County might be higher or lower than is modeled in this EIS. As such, issuing the requested incidental take permit would not be an indispensable prerequisite or an essential catalyst for land development in the county. Similarly, just as implementing a regional HCP would not enable land development; failure to implement a regional HCP would not impede development because alternative means of compliance with the ESA are available. Therefore, only the most general casual relationship can be established between the issuance of an incidental take permit for a regional HCP and the potential impacts of individual land development activities.

It is important to bear in mind, however, that this EIS assesses the relevant environmental impacts for the No Action alternative at a geographic scale and over a period of time that substantially exceeds what would be compiled if the No Action alternative was actually implemented. Impacts are assessed as a collective in this EIS, rather than site-by-site with the No Action alternative. Assuming that a regional HCP had not been proposed, the environmental impact assessment associated with each development project in Hays County would have been tied to the landowner's ESA compliance actions. Further, the analysis would not have been conducted until a specific project was proposed. In most cases, the level of study associated with an individual project would be less comprehensive than in this EIS for the following reasons: 1) most small-scale HCPs are approved with an Environmental Assessment rather than an EIS; 2) Section 7 consultations do not cover the breadth of topics covered in this

EIS; 3) landowners that avoid impacts to endangered species produce no environmental impact assessments; and 4) landowners who do not comply with the ESA would not conduct any assessment under NEPA.

While other Federal regulatory programs might trigger more comprehensive environmental assessment documentation for particular development projects, it is unlikely that a county-wide EIS-level review would be compiled. By contrast, this EIS provides a detailed environmental impact assessment of relevant impacts for the No Action and the action alternatives throughout the county. This means that if the proposed RHCP or one of the other action alternatives is implemented, the relevant impacts of all ESA compliance options will have been considered in this EIS. Although this does not relieve project proponents who choose options other than participation in a regional HCP from compiling necessary environmental impact assessments at the time they commence with their projects, it does provide assurance that a regional HCP is implemented with a full understanding of the possible impact scenarios, regardless of the level of landowner participation in a regional HCP. This EIS will also serve as a valuable reference point for projects that do not use a regional HCP compliance option.

In the following analysis, it is assumed that not all of the anticipated land development projects will seek to participate in the Hays County RHCP or other action alternatives. For the non-participating projects, ESA compliance would proceed as described for the No Action alternative and will, therefore, be disregarded in the impact analysis.

## 5.2 Water Resources

Impacts to water resources would be considered significant if they were to result in one or more of the following types of impacts:

- Surface water and groundwater quality would be measurably altered so as to not be suitable for designated uses as defined by Texas Surface Water Quality Standards or that would not meet the state's policy of nondegradation of groundwater quality established in Section 26.401 of the Texas Water Code.
- Significant recharge features would be modified to the point where groundwater availability (volume) would be measurably altered.
- Surface water availability would be measurably altered for one or more TCEQ classified stream segments as defined in the Texas Surface Water Quality Standards.

The terms used to describe the anticipated intensity of impacts are defined below:

Negligible: Impacts to water quality and water quantity would not be detectable. Water quality parameters would be well below all water quality standards for the designated use. Water quality, recharge features, and surface water availability would be within the historical baselines and

normal variability.

Minor: Impacts to water quality and quantity would be detectable, with measurable changes from historical norms, but would be well within current standards for the designated use and would not threaten future uses.

Moderate: Impacts would be readily apparent, with measurable changes from historical norms. Water quality, the condition of recharge features, and water availability would be outside of the range of historical ambient conditions and would not consistently meet current standards. However, the degree of impact would not permanently preclude future uses of water resources, such as a permanent degradation in water quality or a complete loss of recharge or surface water features. Mitigation would be needed to offset adverse effects and would be reasonably likely to succeed.

Major: Impacts would be readily apparent, with measurable changes from historical norms. Some water quality parameters would frequently or permanently exceed standards for the designated use. The condition of recharge features and surface waters would be outside of the range of historical ambient conditions, and could include a complete loss of some features. Extensive mitigation would be needed to offset adverse effects, and success may not be achieved

### 5.2.1 Water Resources Impacts – Alternative A (No Action)

Under the No Action alternative, the Service would not issue an ESA Section 10(a) permit associated with a regional HCP and Hays County would not implement a regional HCP. Implementation of the No Action alternative would result in land development proceeding within Hays County as expected under current trends and under standard ESA rules and guidance. Current trends in population growth suggest natural vegetation types (i.e., forests, shrublands, and grasslands) and agricultural rangelands (i.e., mostly native and improved pastures) in Hays County will increasingly be converted to developed land uses (primarily associated with residential and commercial projects, as well as associated public and private infrastructure). The details of these development projects cannot be known at this time; however, it can be assumed that they would include activities such as vegetation clearing, re-grading soils and altering existing topography, paving surfaces, and constructing buildings and other structures. These types of activities have the potential to directly and indirectly affect water resources.

Numerous studies have shown that an increase in impervious cover generally corresponds to a decrease in water quality (Horner et al. 1996, U.S. Geological Survey 1999, Brant and Kauffman 2000). More specifically, Ging (1999) and Bush et al. (2000) found that when comparing the quality of stormwater runoff in streams draining urbanized areas and streams draining undeveloped rangeland, higher concentrations of pesticides, volatile organic compounds, nitrates, trace elements, and sediment were generally present in the urban streams. This is partially as a result of the larger number of contaminants present in an urban environment and partially as a result of replacing water resources and vegetative communities with impervious cover. Vegetation anchors soil and filters the runoff that flows across it, allowing sediment to settle out and removing some contaminants. Removing vegetation increases the probability of erosion and increased sedimentation of stormwater runoff and eliminates an important natural filtering mechanism. In contrast, paved surfaces can channel runoff directly into streams, along with pollutants present on the paved surface (e.g., oil, gasoline, and rubber). This can result in less filtering of water, higher water velocities, increased erosion, and larger sediment loads entering streams and recharge features.

In addition to increased contamination of surface water and groundwater, greater amounts of impervious cover could also cover recharge features and reduce infiltration of precipitation into the soil, thereby reducing groundwater recharge (City of Olympia 1996, Chenoweth 2004). Particularly for the Edwards Aquifer, the quality of groundwater is related to the quality of surface water recharging the aquifer. The geologic material of karst aquifers, such as the Edwards Aquifer, make them especially susceptible to contamination, as the large pore size within karst geology provides little filtration of recharging waters. According to Bush et al. (2000), water from urban groundwater wells in the Edwards Aquifer recharge zone exhibited the same frequently detected pesticides as those present in surface water at urban sites, indicating a correlation between the quality of recently recharged groundwater in an urban setting and the quality of urban surface water.

In addition, as discussed in Section 4.2, many caves, sinkholes, and other karst features are known to occur in Hays County. Potential impacts to these recharge features would continue to be minimized through the implementation of TCEQ guidelines, which could include protection by recommended setbacks. However, TCEQ would analyze these features on a project-by-project basis, which could result in closures of some karst features in an effort to protect groundwater quality.

With respect to impacts to water resources, future land uses in Hays County would be required to comply with applicable existing local, state, and Federal regulations protecting water quality on a project-by-project basis. For example, some municipalities within Hays County have impervious cover limits, erosion control standards, and requirements for water protection plans that apply to development projects within their jurisdictions. Under the Edwards Aquifer Protection Program, the TCEQ requires preparation of a Water Pollution Abatement Plan for any development on the Edwards Aquifer recharge zone (approximately 23 percent of Hays

County lies over the Edwards Aquifer recharge zone) and enforces minimum setbacks for development near recharge features. The U.S. Army Corps of Engineers regulates impacts to waters of the U.S. under Section 404 of the Clean Water Act. These measures, and many other programs, standards, and regulations that manage and oversee impacts to water quality and quantity, help to minimize the negative impacts of land development on surface waters and groundwater resources. Any necessary ESA authorizations related to these projects would also occur under existing compliance alternatives (i.e., individual ESA Section 10(a) permits or Section 7 consultations).

Even with these programs, however, an overall increase in land development and urbanization could be expected to cause direct and indirect adverse impacts on water resources, including 1) increased contamination of both surface water and groundwater, 2) reduced aquifer recharge, and 3) an overall decrease in water availability as current water resources become fully allocated. The intensity of these potentially adverse impacts over 30 years, considering the existing regulatory environment, would likely be minor to moderate under the No Action alternative.

### 5.2.2 Water Resources Impacts – Alternative B (Proposed Hays County RHCP)

As described in Section 4.1, the regional HCP action alternatives (including the proposed RHCP) are likely to have only minor impacts on the development trends over the next 30 years. Therefore, the adverse impacts to water resources that would be expected under the proposed RHCP alternative would be similar to those described for the No Action alternative, since implementation of the proposed RHCP would not be expected to substantially affect the amount, timing, or location of land development anticipated over the next 30 years. Future land development projects under this alternative, as with the No Action Alternative, would be expected to comply, on a case-by-case basis, with existing local, state, and Federal water quality regulations, standards, and programs.

However, compared with the No Action alternative, the proposed RHCP would be expected to result in a greater level of land conservation due to increased compliance with the ESA. It is anticipated that approximately 10,000 to 15,000 acres of undeveloped land containing habitat for the covered species would be permanently protected under this alternative. It is likely that this level of open space conservation would not occur under the No Action Alternative, since existing levels of compliance with the ESA are low and, even with increased enforcement by the Service, the lack of a streamlined alternative is somewhat of a barrier to ESA compliance. Conservation of large tracts of open space in Hays County is likely to protect natural streams and associated riparian corridors.

As described above, natural buffers along creeks and streams filter pollutants and absorb flood waters. These vegetated areas would slow down water and allow for pollutants to drop out of the storm water before they reach surface waters and groundwater. The protection of thousands of acres of natural vegetation in Hays County under the proposed RHCP would

protect surface and groundwater resources by preserving the natural ecological processes that filter stormwater runoff and absorb flood waters for aquifer recharge. Although tracts that provide benefits to multiple species may rank higher during the County's evaluation of potential preserve lands

Therefore, the protection of natural vegetation in the RHCP preserve system would likely yield some indirect beneficial impacts to water resources, compared to the No Action alternative. These potentially beneficial effects could, in association with other applicable water resource regulations, further mitigate some of the generally adverse effects of land development on the quality and availability of water resources in Hays County. The preserve lands established under the proposed RHCP would likely be composed of large parcels of land, compared to the typically smaller, fragmented preserves that would be expected as the result of numerous, uncoordinated, project-by-project mitigation efforts. The RHCP preserve system would also be assembled in addition to any on-site setbacks or buffers for streams, springs, and recharge features that would otherwise be required by applicable federal, state, and local water-related regulations.

Therefore, the large preserve blocks created by implementation of the RHCP would likely result in more assured protection for any water resources contained within the preserves over the long term than would be the case under the No Action alternative. The impact of these large preserve blocks would be relatively small, however, as the total area that would be preserved under this alternative would be small compared to the total size of the area of potential effect. Thus, it is likely that the proposed RHCP would be expected to have negligible to minor beneficial effects on water resources in Hays County, compared to the No Action alternative.

### 5.2.3 Water Resources Impacts – Alternative C (Moderate Preserve/Limited Take)

As for the proposed alternative, the Moderate Preserve/Limited Take alternative would also not have a significant influence on the amount, timing, or location of land development anticipated over the next 30 years. Therefore, the potentially adverse impacts to water resources resulting from anticipated land development (whether authorized through a regional HCP, an individual ESA authorization, or without specific ESA compliance) would be similar to the impacts described for the No Action alternative. Future land development projects under this alternative, as with the No Build Alternative, would be expected to comply, on a case-by-case basis, with existing local, state, and Federal water quality regulations, standards, and programs.

The primary difference between the Moderate Preserve/Limited Take alternative and the No Action alternative is the establishment and long-term management of a pre-determined 3,000-acre preserve system. Creating these large preserves and restricting public access would protect natural landscapes along creeks and streams, thus filtering pollutants and absorbing flood waters. These vegetated areas would slow down water and allow for pollutants to drop out of the storm water before they reach surface waters and groundwater.

While some habitat conservation would occur under the No Action alternative as the result of individual ESA compliance actions, the extent of these individual preserves would likely be less than the assured protection of 3,000 acres under Alternative C and the distribution of preserved lands under the No Action alternative would likely be more scattered. The creation of a larger block of preserve land with more assured protection and guided management is likely to create a more effective buffer for streams contained within the 3,000-acre preserve system than would be achieved with fewer, smaller, and more scattered protected areas under the No Action alternative.

Thus, these larger blocks of preserved native vegetation protected from development by Hays County would be more likely to yield benefits to water resources than the mitigation measures that would result from project-by-project authorizations with the Service. The differential would be small, however, as the total area that would be preserved under this alternative would be small compared to the total size of the area of potential effect. Therefore, the beneficial impacts of the Moderate Preserve/Limited Take alternative on water resources would likely be negligible.

### 5.2.4 Water Resources Impacts – Alternative D (Large-scale Preserve System)

The 163,000 acres of authorized incidental take of habitats for the golden-cheeked warbler and black-capped vireo under the Large-scale Preserve System alternative may adversely affect both surface water and groundwater, as described for the No Action alternative. However, potential adverse impacts on water resources as a result of anticipated land development over the next 30 years would be minimized, as under the No Action alternative, by compliance with existing local, state, and Federal water quality regulations, standards, and programs. Therefore, the potential adverse impacts of the Large-scale Preserve alternative would be similar to those expected under the No Action alternative.

The establishment and long-term management of a 30,000-acre preserve system, as proposed under this alternative, would yield beneficial impacts to water resources in Hays County. This large preserve system would contain larger areas of contiguous, undeveloped land throughout Hays County than the No Action alternative. Protecting such large, contiguous areas and tightly controlling public access would result in the protection of water recharge areas and the buffering of streams to help preserve water quality. In addition, as discussed previously, these buffers would slow down stormwater runoff and decrease flooding. As a result, the Large-scale Preserve System alternative could have a minor to moderate benefit to water resources in Hays County, compared to the No Action alternative.

## 5.3 Vegetation

Vegetation would be affected within the Hays County, as take of the covered species would be expressed as a specified number of acres of potentially suitable habitat lost or

modified, and mitigation for that take would be the preservation and management in perpetuity of an equivalent amount of suitable habitat for the covered species.

Impacts to vegetation that would result from implementation of the various alternatives would be considered significant if they were to result in the following:

- The existing levels of native vegetation would increase (a beneficial impact) or decrease (an adverse impact) on a landscape scale
- Non-native plants replaced substantial or important components of native vegetation communities (an adverse impact) or non-native plants were removed from native vegetation communities (a beneficial impact).

The intensity of potential impacts to vegetation is defined as follows:

Negligible: Individual native plants may occasionally be affected (i.e., displaced or out competed), but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

Minor: Effects to native plants would be measurable or perceptible, but localized within a small proportion of the native plant community. The viability of the plant community would not be affected and the community, if left alone, would recover.

Moderate: A change would occur over a relatively large portion of the native plant community that would be readily measurable in terms of species composition, vegetation structure, or habitat quality for native wildlife. Mitigation measures would likely be necessary to offset adverse effects and would likely be successful.

Major: Effects to native plant communities would be readily apparent and substantially change native vegetation communities over a large portion of the community. Extensive mitigation would be needed to offset adverse effects and its success would not be assured.

### 5.3.1 Vegetation Impacts – Alternative A (No Action)

As previously described, it is anticipated that approximately 57,700 acres of new land development will occur in Hays County over the next 30 years. While the location, magnitude, and nature of specific activities associated with future commercial, residential, and other types of development cannot be predicted at this time, it can be assumed that the predicted extent of new development would include clearing and altering of vegetation prior to construction. This expected increase in development and urbanization would result in moderate adverse impacts on vegetation, including the local removal of entire patches of native vegetation communities.

Under the No Action Alternative, the natural vegetation within the existing undeveloped areas of Hays County (which consists of native and/or introduced grasses; crops; live oak-Ashe juniper parks; live oak-mesquite-Ashe juniper parks; and live oak – Ashe juniper woods) is expected to significantly decrease over the next 30 years. With new land development, areas of native vegetation would be replaced with impervious cover and landscaping that is frequently composed of non-native vegetation, such as turfgrass and ornamental plants. As indicated in Table 4-2, forested landscapes may be heavily affected if current trends continue.

The fragmentation of native vegetation communities by land development can also facilitate the invasion and establishment of non-native plants in adjacent native vegetation communities. Many of the common plants used in residential landscaping are not native to Central Texas or even North America. All too often, these non-native landscaping plants are able to escape cultivation and thrive outside of our yards and gardens. While many non-native, ornamental plants do offer food and shelter to some wildlife species, they often degrade the quality of habitat available to native wildlife when they escape into natural areas. Since these plants are not in their natural environment, many are able to flourish unchecked by their natural competitors, forming dense stands of vegetation that often outcompete native plants for light, water, and nutrients. As a result, the diversity of native trees, shrubs, vines, grasses, and forbs is reduced, and the native wildlife species that depend on this diversity of native plants must look elsewhere for the habitat they require. Non-native plants are a common problem in Central Texas parks and natural areas, particularly along streams, creeks, and roads – areas where soils are frequently disturbed and the potential for seed movement is high. Once non-natives are established, they are almost impossible to eradicate (generally requiring the use of herbicides).

Under the No Action Alternative, the impacts of development to some vegetation communities, particularly those that provide habitat for endangered species, would be mitigated on a case-by case basis when landowners individually comply with the ESA. Other natural vegetation communities, such as riparian plant communities along water ways, could also be protected through compliance with other local, state, and Federal regulations. As a result, some parcels containing natural vegetation communities would be preserved on a case-by-case basis and result in negligible beneficial impacts to vegetation in Hays County.

In addition to conservation areas set aside to avoid or mitigate impacts to regulated resources, it is likely that other areas of natural vegetation would be protected by through efforts to create parks and other types of publicly accessible open spaces. Hays County includes several community or regional parks, greenbelts/greenspaces, preserves, academic research tracts, and privately owned conservation easements that total approximately 23,739 acres. These open spaces protect a variety of natural vegetation communities from intensive development.

There are no county-wide vegetation protection regulations within Hays County. However, under the No Action alternative, future development would be subject to any tree

preservation and landscape ordinances established by the municipalities within Hays County. To minimize adverse impacts, development activities within these communities would be expected to comply, on a case-by-case basis, with the appropriate ordinances per each municipality's development codes. These ordinances are intended, in part, to preserve native vegetation and require protection or replacement of trees of a certain size, as well as revegetation of areas not fully occupied by buildings, parking areas, or other impervious surfaces.

Overall, the No Action alternative could have moderate adverse impacts on native vegetation communities in Hays County.

### 5.3.2 Vegetation Impacts – Alternative B (Proposed Hays County RHCP)

Compared to the No Action alternative, the proposed RHCP would have similarly moderate adverse impacts resulting from the anticipated extent of new land development, since the regional HCP alternatives are not expected to significantly affect the extent, timing, or location of land development activities in Hays County over the next 30 years (see Section 4.1). As for the No Action alternative, these anticipated adverse impacts would be moderated by the existing inventory of protected open spaces in Hays County and a variety of open space protection measures related to regulatory compliance and parks initiatives.

Under the proposed RHCP, additional mitigation for vegetation impacts would be accomplished through increased ESA compliance. Approximately 10,000 to 15,000 acres of native vegetation communities (primarily forest and shrubland vegetation used by the golden-cheeked warbler and black-capped vireo) would be protected under this alternative. The extent of protection for forest and shrubland communities under the proposed RHCP is several thousand acres more than would likely be protected under the No Action alternative, since the level of ESA compliance under the No Action alternative is likely to be lower than under the proposed RHCP with its streamlined compliance alternative. The protection and management of relatively large blocks of native vegetation under the proposed RHCP will also help prevent the invasion and establishment of non-native plants, since large preserve blocks have fewer edges and less exposure to adjacent land uses (compared to the overall size of the tract) than do smaller parcels.

The RHCP preserve system would also target forest vegetation for protection, which is the vegetation type that appears to be most vulnerable to loss, based on recent trends, and is a mature vegetation community that takes decades to form. The conservation program included in the RHCP requires management and monitoring of protected lands in perpetuity to minimize the impacts of adjacent land uses on the preserve system. The proposed RHCP also requires that plan participants take precautions against the spread of oak wilt when conducting vegetation clearing and construction activities on individual project areas. Therefore, the mitigation provided by the proposed RHCP would result in a minor to moderately beneficial impact to vegetation communities in Hays County, compared to the No Action alternative.

### 5.3.3 Vegetation Impacts – Alternative C (Moderate Preserve/Limited Take)

As previously stated, the Moderate Preserve/Limited Take alternative would consist of the development of a regional HCP with a 3,000-acre preserve system in return for incidental take authorization on 3,600 acres of golden-cheeked warbler or black-capped vireo habitat. The authorized take of 3,600 acres of golden-cheeked warbler and black-capped vireo habitat under this alternative would be a part of the total anticipated amount of new land development that is projected to occur regardless of the availability of a regional HCP. Therefore, the potential adverse effects of land development activities, including those authorized under this alternative, would be similar to the effects of No Action alternative since the availability of a regional HCP is not expected to significantly affect the extent, timing, or location of land development in Hays County over the next 30 years (see Section 4.1). Similar to the No Action alternative, removal or alteration of native vegetation communities by land development would be expected to be conducted in compliance with existing vegetation ordinances of the municipalities within Hays County.

The proposed 3,000-acre preserve system would protect vulnerable forest vegetation in Hays County from land development, and ensure that it was managed in perpetuity to reduce threats from adjacent land uses. This regional HCP would also require participants to implement oak wilt precautions on individual project areas. Compared to the No Action alternative, this additional mitigation would have a beneficial effect on vegetation in Hays County. However, due to the moderate size of the preserve system and limited extent of allowed participation under this alternative, these benefits would likely be minor.

### 5.3.4 Vegetation Impacts – Alternative D (Large-scale Preserve System)

Direct, adverse impacts under this alternative to vegetation communities in Hays County would include the authorized take of up to 163,000 acres of golden-cheeked warbler and black-capped vireo habitat during the permit term. While up to 163,000 acres of habitat for the golden-cheeked warbler and black-capped vireo would be authorized for take, only a fraction of this amount would be expected to occur during the duration of the plan (i.e., projections estimate that only approximately 57,700 acres of new land development will occur in Hays County during the term of the plan, regardless of the impact to endangered species habitat). Therefore, the potentially adverse effects of land development during the duration of the plan would be similar to that described for the No Action alternative.

The establishment of a 30,000-acre preserve system containing habitat for the golden-cheeked warbler and black-capped vireo in Hays County would have a moderately beneficial effect on vegetation communities, particularly forests. A preserve system of this size, assembled in a number of large contiguous blocks (some of which would likely be adjacent to currently protected open spaces in Hays County), would have the potential to protect large-scale ecosystem functions that would help ensure that natural processes are able to maintain vegetation communities in perpetuity. Large preserve blocks would minimize the potential for

non-native vegetation to invade and affect habitats for native wildlife and plan participants would be required to implement oak wilt precautions on individual project areas. Therefore, it is likely that implementation of the Large-scale Preserve System alternative would have a moderately beneficial effect on vegetation in Hays County.

## 5.4 General Wildlife

Wildlife occupying the habitats that would be lost or modified as a result of activities covered for incidental take and areas protected and managed as mitigation could potentially be affected by the action alternatives. Impacts to general wildlife populations would be considered significant if they were to result in the following:

- The presence of self-sustaining native wildlife communities (with a natural balance of species and numbers of individuals) would increase (a beneficial impact) or decrease (an adverse impact) in Hays County.

The intensity of potential impacts to wildlife populations is defined as follows:

Negligible: Self-sustaining native wildlife communities would not be affected as the effects would be at or below the level of detection and so slight that they would not be of any measurable or perceptible consequence to wildlife populations.

Minor: Effects to self-sustaining native wildlife communities would be measurable or perceptible (such as slight shifts in species composition or relative abundance of certain species), but localized within a small area. The wildlife community, if left alone, would recover.

Moderate: A change to self-sustaining native wildlife communities would occur over a relatively large area. The change would be readily measurable in terms of species composition, the relative abundance of certain species, or the distribution of a particular community as a whole. Mitigation measures would likely be necessary to offset adverse effects and would likely be successful.

Major: Effects to self-sustaining native wildlife communities would be readily apparent and would substantially change wildlife populations over a large area. Changes would be evident in species composition, the relative abundance of certain species, or the distribution of a particular community as a whole. Extensive mitigation would be needed to offset adverse effects, and success may not be achieved

### 5.4.1 General Wildlife Impacts – Alternative A (No Action)

As previously described, it is anticipated that approximately 57,700 acres of new land development will occur in Hays County over the next 30 years. Residential development impacts natural environments in several ways, such as replacing native vegetation with buildings, pavement, and other man-made structures (e.g., direct habitat loss) (McIntyre and Hobbs 1999), decreasing the amount of continuous open-space (e.g., fragmentation), and increasing vegetational disturbance, erosion, and soil compaction (Bradley 1995). Residential development often results in the introduction of non-native vegetation through invasion or landscaping with non-native, ornamental plants (Whitney and Adams 1980, Mills et al. 1989, Bolger et al. 1997). Urbanization also can change the abundance of predators and competitors in an area (Wilcove 1985, Engels and Sexton 1994, Jokimaki and Huhta 2000) and increase disturbance from human activity (Whitcomb et al. 1981). Physical changes to the natural landscape, as well as the possible alteration in predator or competitor interactions resulting from urbanization can have a profound impact on wildlife communities (Freisen et al. 1995). Thus, while certain species may benefit from human activities, land development typically alters the processes that maintain balance in native wildlife communities, resulting in adverse effects to self-sustaining native wildlife communities. Therefore, activities under the No Action Alternative have the potential to cause moderate, direct, and indirect adverse impacts to wildlife populations through habitat changes, introduction of non-native species, and other alterations to the natural balance of native wildlife species.

A general list of wildlife species likely to occur within Hays County is provided in Section 4.4. Impacts to these species would vary based on the type of habitat impacted by development activities and the sensitivity of each species to human-induced changes to native habitats or wildlife communities. However, in general, the natural composition and stability of native wildlife communities would decline concurrently with the expansion of the human population into their habitats. Should this projected future development incorporate areas of natural green space, this anticipated decline could be minimized.

Title 5 of the Texas Parks and Wildlife Code describes laws and matters regarding forests, water district and river authority parks, Texas trails systems, wildlife and plant conservation, hunting and fishing licenses, commercial and fish farmer's licenses, the Uniform Wildlife Regulatory Act, hunting, endangered species, crustaceans and mollusks, wildlife management areas, sanctuaries, and preserves, including Federal-state agreements. The code also establishes special standards for non-game species, such as bats (Texas Parks and Wildlife Code, Title 5, Chapter 63.101).

Most urbanized animals are not seasonally hunted or treated as game, while the hunting of game animals such as white-tailed deer are restricted to specific seasons and heavily regulated. Avian species are protected by both the provisions of the Texas Parks and Wildlife Code, and the Migratory Bird Treaty Act, which prohibits the taking, killing, or possession of all

migratory birds (with the exception of several non-native species). While these regulations protect wildlife to some degree, they provide no protection to the habitat required for wildlife survival.

Under the No Action Alternative, development on land that provides habitat for endangered species would be mitigated on a case-by-case basis, but most land development would commence without conservation of open spaces as mitigation for impacts. However, as this mitigation would be specific to the affected listed species, these lands would likely not be suitable for all wildlife species. Project-by-project mitigation is also likely to result in small and isolated patches of protected habitat with a high potential for adverse edge effects from adjacent human activities. Thus, any mitigation under the No Action Alternative would generally result in negligible beneficial impacts to native self-sustaining wildlife communities.

### 5.4.2 General Wildlife Impacts – Alternative B (Proposed Hays County RHCP)

Since the trends in land development would be similar under the No Action alternative and the proposed RHCP, the impacts to the general wildlife communities in Hays County would also be similar. As described above, anticipated land development over the next 30 years would convert currently undeveloped open space used by a wide variety of wildlife species to developed land uses. While some wildlife species thrive in urbanized environments, most wildlife communities currently present in Hays County would experience a decrease in habitat and likely declines in population sizes. Therefore, both alternatives would likely result in moderately adverse effects on most Hays County wildlife species, and the true impacts of the proposed RHCP on wildlife communities would be tied to the proposed conservation measures of the RHCP.

The proposed RHCP would facilitate ESA compliance for land development projects impacting potential habitat for the covered species and would result in the creation of a preserve system of approximately 10,000 to 15, 000 acres.

Protecting contiguous open space is crucial for many wildlife species as they depend on numerous habitats throughout their lives. In addition, contiguous forest habitat supports native wildlife species that require large areas to survive. Such habitat supports natural ecological processes, such as predator/prey interactions and natural disturbance. It also serves to buffer species against the negative consequences of fragmentation. In the absence of such habitat, many birds are greatly affected by increased rates of nest predation from raccoons, skunks, and squirrels, as well as nest parasitism from brown-headed cowbirds. Many of the native migratory songbird populations are now in decline due, in part, to the loss of contiguous forest habitat (Terborgh 1989, Vermont Fish and Wildlife Department 2004).

The preserve system would incidentally benefit a variety of native wildlife species in Hays County, particularly those that utilize forest habitats. However, given the mosaic of habitat types across the Hays County landscape, it is likely that the preserve system (while targeting areas

of potential habitat for the covered species) would also contain substantial native vegetation communities that would support the sheltering, nesting, and foraging requirements for many other wildlife species.

Ongoing management of the preserve system and a public education program (particularly for landowners adjacent to preserve lands) would seek to reduce adverse edge effects from adjacent land uses, such as keeping pets indoors or contained, native plant landscaping, and appropriate ways to feed backyard wildlife, which would further minimize the generally adverse effects of land development on native wildlife. This mitigation would result in a moderate beneficial impact to wildlife resources since the RHCP would focus on preserving these large, contiguous tracts in perpetuity.

### 5.4.3 General Wildlife Impacts – Alternative C (Moderate Preserve/Limited Take)

As described in Section 4.1 for the action alternatives, the Moderate Preserve/Limited Take alternative is not expected to influence land development trends in Hays County. Therefore, the potentially adverse impacts from land development (including the approximately 3,600 acres of impact to habitats for the covered species authorized by this alternative) on the general wildlife communities in the county would be similar to those described for the No Action alternative. The effects of the Moderate Preserve/Limited Take alternative on general wildlife communities in Hays County would be related to the conservation measures associated with this alternative.

The preserve system under this alternative would include the preservation of large (500-acre minimum) tracts of undeveloped land totaling approximately 3,000 acres. When compared to the No Action alternative, the preserves under this alternative would likely be larger and more contiguous than would be established per the mitigation requirements of individual, project-specific ESA authorizations. Protecting contiguous open space is crucial for many wildlife species as they depend on numerous habitats throughout their lives. In addition, contiguous forest habitat supports native wildlife species that require large areas to survive. Such habitat supports natural ecological processes, such as predator/prey interactions and natural disturbance. It also serves to buffer species against the negative consequences of fragmentation. In the absence of such habitat, many birds are greatly affected by increased rates of nest predation from raccoons, skunks, and squirrels, as well as nest parasitism from brown-headed cowbirds. Many of the native migratory songbird populations are now in decline due, in part, to the loss of contiguous forest habitat (Terborgh 1989, Vermont Fish and Wildlife Department 2004).

As described for the proposed RHCP, a preserve management program and public education program would accompany the creation of the preserve system and help to minimize typically adverse edge effects on native wildlife communities within the preserve system from adjacent land uses.

Therefore, given the scale of this alternative, the establishment of the 3,000-acre preserve under this alternative would likely have a minor beneficial impact on general wildlife communities when compared to the No Action alternative.

### 5.4.4 General Wildlife Impacts – Alternative D (Large-scale Preserve System)

As for the other alternatives, the Large-scale Preserve System alternative is not expected to influence land development trends in Hays County over the next 30 years, since participation in the regional HCP would be voluntary and other ESA compliance options are available. Therefore, even though this alternative would authorize the loss of up to approximately 163,000 acres of habitat for the golden-cheeked warbler and black-capped vireo (which is more than would be expected to occur over the next 30 years), the potentially adverse impacts to wildlife species would be similar to that described for the No Action alternative.

The preserve system under the Large-scale Preserve System alternative would include approximately 30,000 acres. Protecting contiguous open space is crucial for many wildlife species as they depend on numerous habitats throughout their lives. In addition, contiguous forest habitat supports native wildlife species that require large areas to survive. Such habitat supports natural ecological processes, such as predator/prey interactions and natural disturbance. It also serves to buffer species against the negative consequences of fragmentation. In the absence of such habitat, many birds are greatly affected by increased rates of nest predation from raccoons, skunks, and squirrels, as well as nest parasitism from brown-headed cowbirds. Many of the native migratory songbird populations are now in decline due, in part, to the loss of contiguous forest habitat (Terborgh 1989, Vermont Fish and Wildlife Department 2004).

As described for the proposed RHCP, a preserve management program and public education program would accompany the creation of the preserve system and help to minimize typically adverse edge effects on native wildlife communities within the preserve system from adjacent land uses. The amount of undeveloped land protected under this alternative would likely exceed land protected under the No Action alternative The establishment and long-term management of such a large preserve system, would yield moderate beneficial impacts to native wildlife populations as the preserves would contain numerous, sizable areas of contiguous, undeveloped land throughout Hays County.

## 5.5 Hays County RHCP Covered Species

Two Federally listed species (the golden-cheeked warbler and black-capped vireo) would be covered by the incidental take permit requested under the Proposed Action. Indicators of impact significance vary by species and are further described in the Section below. However, definitions of impact intensity are similar for both of these species, and are as follows:

Negligible: Covered species would not be affected or the change would be so small

as to not be of any measureable or perceptible consequence to the population in the area of potential effects. Negligible effects would equate with a "may effect, not likely to adversely affect" determination by the U.S. Fish and Wildlife Service under the ESA.

Minor: There would be a measurable effect on the covered species or their habitats, but the change would be small and relatively localized with respect to the area of potential effects. Minor effect would equate with a "may effect" determination by the U.S. Fish and Wildlife Service under the ESA and would be accompanied by a statement of either "likely" or "not likely to adversely affect" the species.

Moderate: There would be a noticeable effect to the population of the covered species. The effect would be of consequence to populations or habitats in the area of potential effects. Moderate effect would equate with a "may effect" determination by the U.S. Fish and Wildlife Service and would be accompanied by a statement of either "likely" or "not likely to adversely affect" the species.

Major: There would be a noticeable effect with severe consequences or exceptional benefit to populations or habitats of the covered species in the area of potential effects. Major effect would equate with a "may effect" determination by the U.S. Fish and Wildlife Service under the ESA and would be accompanied by a statement of either "likely" or "not likely to adversely affect" the species or habitats.

### 5.5.1 Golden-cheeked Warbler

Impacts to the golden-cheeked warbler would be considered significant if they were to result in one or more of the following:

- The existing primary threats to the mature, juniper-oak woodland habitat used by the species would decrease (a beneficial impact) or increase (an adverse impact) to a substantial degree.
- The size of the local golden-cheeked warbler population in Hays County would substantially increase (a beneficial impact) or substantially decrease (an adverse impact).
- The goals and objectives of the golden-cheeked warbler recovery plan were furthered or met (a beneficial impact) or were precluded from being met (an adverse impact).

#### 5.5.1.1 Golden-cheeked Warbler Impacts – Alternative A (No Action)

Under the No Action alternative, the recent trends affecting the golden-cheeked warbler in Hays County (particularly related to the loss of potential habitat as described in Section 4.2.2 and Section 5.2 of the Hays County RHCP) would be expected to continue through the next 30 years and result in a moderate adverse impact to the species.

Under the No Action alternative, recent trends in population growth, land development, and forest cover loss are likely to continue as projected. It is likely that the construction activities required to support future population growth of the community will impact much of the potential golden-cheeked warbler habitat currently present within Hays County over the next 30 years. As reported in Section 5.2 of the Hays County RHCP, approximately 22,000 acres of potential golden-cheeked warbler habitat may be lost directly to developed land uses. The estimated habitat loss over the next 30 years represents approximately 13 percent of the total amount of potential golden-cheeked warbler habitat that may be available in Hays County (based on the Loomis estimate of the total acres of potential golden-cheeked warbler habitat shown in Table 4-5) and less than four percent of the potentially available golden-cheeked warbler habitat in Recovery Region 5. This level of anticipated habitat loss would likely result in a minor to moderate adverse impact to the species.

Under the No Action alternative, any impacts to occupied golden-cheeked warbler habitat that rose to the level of "take" would require authorization from the Service to proceed in compliance with the ESA. While the impacts and mitigation likely to occur under the No Action alternative are difficult to predict due to the lack of information regarding the precise location and nature of future land development in the County and the inability to predict the future level of compliance with the ESA, it may be assumed that some conservation efforts for the species would take place. ESA authorization would include the requirement that the effects of any incidental take of the golden-cheeked warbler be mitigated to the maximum extent practicable. Frequently, mitigation for habitat loss or degradation involves the permanent protection and management of other habitat. The overall benefit to the species from habitat protection resulting from individual ESA authorizations is likely to be minor, since compliance could be relatively low (to date there has only been one ESA incidental take permit issued for the golden-cheeked warbler in Hays County) and, even if all take was fully mitigated, the mitigation from individual projects is more likely to occur in relatively small and scattered or isolated patches of habitat with relatively low long-term conservation value.

Habitat protection completed as mitigation for individual ESA authorizations could occur either within Hays County or outside of the county. It is possible that some mitigation for impacts in Hays County would occur outside of Hays County, due to the existence of a private mitigation bank located in a nearby county. Therefore, it is possible that the level of habitat protection within Hays County would not fully balance the level of anticipated habitat loss over the next 30 years, resulting in a net loss of habitat in Hays County. Accordingly, a decline in the

Hays County golden-cheeked warbler population may be expected under the No Action alternative. However, a decline in the local Hays County golden-cheeked warbler population would not preclude meeting the recovery goals for Golden-cheeked Warbler Recovery Region 5.

The 1992 Golden-cheeked Warbler Recovery Plan (USFWS 1992) identifies the criteria to be met for the golden-cheeked warbler to be considered for downlisting from endangered to threatened status. These recovery criteria include the protection of sufficient breeding habitat to ensure the continued existence of at least one viable, self sustaining golden-cheeked warbler population in each of the eight recovery regions delineated in the recovery plan, where the potential for gene flow exists across regions to ensure long-term viability of the protected populations (USFWS 1992). Hays County lies predominantly within Recovery Region 5, which also includes all of Travis County and portions of Williamson, Blanco, and Burnet counties.

Attaining the recovery goals for the golden-cheeked warbler includes the identification of "focal areas" for protection that include a single, viable golden-cheeked warbler population or one or more smaller populations that are interconnected (USFWS 1992). Within Recovery Region 5, it appears that a focal area has already largely been protected through the establishment of the Balcones Canyonlands Preserve and the Balcones Canyonlands National Wildlife Refuge in Travis, Williamson, and Burnet counties (Figure 3-3). Currently, these areas comprise approximately 48,250 acres of permanently preserved and managed lands dedicated to the protection of endangered species. These two preserve systems contain approximately 28,440 acres of potential high quality golden-cheeked warbler habitat, based on the results of the Loomis warbler habitat model. Therefore, the No Action alternative would not be likely to preclude the attainment of recovery goals for the golden-cheeked warbler, but would also not be likely to substantially contribute to meeting these goals.

Under the No Action alternative, the recent trends affecting the golden-cheeked warbler in Hays County (particularly related to the loss of potential habitat as described in Section 4.2.2 and Section 5.2 of the Hays County RHCP) would be expected to continue through the next 30 years and result in a moderate adverse impact to the species.

#### 5.5.1.2 Golden-cheeked Warbler Impacts – Alternative B (Proposed Hays County RHCP)

The proposed Hays County RHCP alternative is likely to result in a moderate beneficial impact to the golden-cheeked warbler, compared to the No Action alternative.

Under the proposed Hays County RHCP, the County would receive authorization to incidentally take golden-cheeked warblers related to the loss or degradation of up to 9,000 acres of potential golden-cheeked warbler habitat in Hays County. To mitigate for those impacts, Hays County will create a conservation bank containing habitat for the golden-cheeked warbler, with a target size of between 10,000 and 15,000 acres. The bank would be assembled on a phased basis, as needed over the next 30 years to provide sufficient mitigation credits to offset impacts from participating public and private projects. Under the phased conservation bank

approach, habitat protection would always occur in advance of authorized impacts through the RHCP; however, no pre-determined preserve system would be designated under the RHCP.

As explained in Section 4.1, the Hays County RHCP would be implemented in the same socioeconomic context as the No Action alternative and would experience similar levels and patterns of land development. Accordingly, anticipated land development activities in the county would be expected to have similar potentially adverse effects to the species as described for the No Action alternative. Since implementation of the proposed RHCP would not be expected to substantially influence the total amount of anticipated habitat loss in Hays County during the permit term, the impacts of the proposed RHCP on the golden-cheeked warbler would be primarily associated with the mitigation provided by the plan.

The Service would award mitigation credits to the Hays County RHCP in proportion to the acreage of potential golden-cheeked warbler habitat contained within the preserve system as parcels are acquired. It is anticipated that most preserves will generate one mitigation credit for each acre of potential habitat included within it. However, the Service may alter this ratio if conditions (such as habitat quality, parcel size, or adjacent/interior land uses) warrant such action. Therefore, the actual mitigation value of each preserve parcel in the conservation bank will be based on the specific conditions of each site.

In a similar fashion, Hays County will determine the mitigation needs for potential RHCP participants based on the specific conditions on each project site by conducting an on-site habitat assessment. The direct and indirect impacts to potential habitat would be evaluated by reviewing site plans for plan participants. Mitigation needs for plan participants would be typically determined at a ratio of one mitigation credit required for each acre of impact; although the County would have some flexibility to alter this ratio based on habitat quality, landscape context, or existing impacts in coordination with the Service. Therefore, it is anticipated that impacts to habitat authorized through the RHCP will adequately be balanced by protected habitat in the preserve.

The Service anticipates that the proposed RHCP may increase the amount of ESA compliance in Hays County, compared with the No Action alternative, since compliance will be more efficient than obtaining individual authorization through the Service. Further, the RHCP includes commitments by the County to increase awareness of endangered species issues in Hays County, which may also lead to increased ESA compliance. Increased ESA compliance would benefit the species by ensuring that a larger portion of the anticipated habitat loss over the next 30 years would be balanced with conservation actions, such as habitat protection.

The mitigation provided under the RHCP would likely result in a preserve system with greater conservation value than would likely be achieved if similar acreage was protected and managed through individual ESA Section 10(a) or Section 7 authorizations. The enhanced conservation value of the RHCP preserve system would result from the protection of larger

blocks of potential habitat than would likely be achieved for smaller, individual mitigation actions.

Overall, the proposed RHCP would protect large areas of potential habitat in the county from future land development, thereby decreasing the threat of habitat loss for many important areas of potential golden-cheeked warbler habitat in Hays County and resulting in a beneficial impact to the species. The ultimate size of the preserve system will be proportional to the amount of impact authorized through participation in the RHCP, and may ultimately include approximately 10,000 to 15,000 acres permanently protected and managed for the benefit of the golden-cheeked warbler. A preserve system of this size would be likely to have a moderate beneficial impact on the golden-cheeked warbler population in Hays County. It is difficult to predict precisely how golden-cheeked warbler populations would be affected by the protection of several thousand acres of potential golden-cheeked warbler habitat in Hays County (see Sections 6..3 and 6.4 of the RHCP for detail on the operation of the phased conservation banking approach and preserve acquisitions). It is possible that this modestly sized preserve system would have a minor beneficial impact on the size of the regional golden-cheeked warbler population. However, the Region 5 golden-cheeked warbler population is likely to be influenced more heavily by the ongoing management and possible expansion of protected areas associated: with the Balcones Canyonlands Preserve and the Balcones Canyonlands National Wildlife Refuge. The local golden-cheeked warbler population in Hays County could also experience increases in population with the protection and management of high quality habitats in the county; however, the overall effect with regard to changes in population size would probably be relatively minor.

With regard to recovery goals, the RHCP would be unlikely to protect or create a new "focal" area for golden-cheeked warbler conservation. In Recovery Unit 5, this goal is being substantially met in Travis, Williamson, and Burnet counties. However, recovery goals for the golden-cheeked warbler also include protection of interconnecting habitats between focal areas. The proposed RHCP preserve system would contribute to this facet of the golden-cheeked warbler recovery plan by providing some connectivity between large blocks of potential habitat in adjacent Travis and Comal counties. Therefore, this alternative will likely have a positive effect on the ability of recovery goals being met. The proposed Hays County RHCP alternative is likely to result in a moderate beneficial impact to the golden-cheeked warbler, compared to the No Action alternative.

#### 5.5.1.3 Golden-cheeked Warbler Impacts – Alternative C (Moderate Preserve/Limited Take)

Overall, the Moderate Preserve/Limited Take alternative is likely to result in only minor beneficial impacts to the golden-cheeked warbler.

The Moderate Preserve/Limited Take alternative would authorize the loss or degradation of approximately 3,600 acres of potential habitat for the covered species within Hays County associated with public and private land development activities. Most of this

authorized impact would affect golden-cheeked warbler habitat. As mitigation, the County would collect mitigation fees from plan participants and acquire at least 3,000 acres of preserve system containing a large proportion of high quality golden-cheeked warbler habitat. Acquisition of the pre-determined preserve system would occur within the first four years of the plan.

The Moderate Preserve/Limited Take alternative is assumed to occur within the same socioeconomic context as described for the No Action alternative (i.e., projected population increases and associated increases in land development and forest loss). As such, the amount of authorized habitat loss or degradation would constitute a portion of the total amount of habitat loss that is projected to occur under the No Action alternative (i.e., approximately 16 percent of the 22,000 acres of total anticipated habitat loss over 30 years). The remainder of the anticipated habitat loss would either be authorized through individual ESA Section 10(a) permits or Section 7 consultations, or would occur unlawfully without ESA authorization.

It is possible that the Moderate Preserve/Limited Take alternative would increase the amount of ESA compliance in Hays County, compared with the No Action alternative, since compliance would be substantially easier than obtaining individual authorization through the Service. However, without a permit amendment, the potential benefits of increased ESA compliance would be limited by the modest level of incidental take authorization available under this alternative.

As described in Section 5.1.2 above, issuing an incidental take permit under the Moderate Preserve/Limited Take alternative is not an "indispensable prerequisite" or an "essential catalyst" for land development in Hays County, and implementing this alternative regional HCP would not enable or impede future land development because alternative means of compliance with the ESA are available. Therefore, the potentially adverse impacts of this alternative would be similar to those described for the No Action alternative (i.e., the alternative would provide ESA authorization for a portion of the total amount of anticipated habitat loss in Hays County over the next 30 years, but would not be expected to substantially increase or decrease the total amount of anticipated habitat loss during that time). The remaining impacts of this alternative on the golden-cheeked warbler would be primarily associated with the mitigation provided by the 3,000-acre preserve system.

Under the Moderate Preserve/Limited Take alternative, authorized impacts to up to 3,600 acres potential golden-cheeked warbler habitat in Hays County would be mitigated by the permanent protection of approximately 3,000 acres of high quality golden-cheeked warbler habitat. While the mitigation ratio under this alternative is slightly less than one acre of habitat protected for each acre lost or degraded, the ratio would be justified by the relatively high quality of the protected habitat likely to be included within the pre-determined preserve system compared with the typically lower quality of potential golden-cheeked warbler habitat across the remainder of Hays County (approximately 80 percent of the potential golden-cheeked warbler

habitat in Hays County is identified as "low" or moderate" quality, based on the Loomis habitat model).

Hays County would identify specific criteria for the location, size, configuration, and habitat composition of the 3,000-acre preserve system within the plan, and would commit to the acquisition of a preserve system consistent with these criteria. The preserve system would be designed and managed to maximize the conservation value of the protected lands.

The mitigation provided under the Moderate Preserve/Limited Take alternative would likely result in a preserve system with greater conservation value than would be achieved if a similar acreage was protected and managed through individual ESA Section 10(a) or Section 7 authorizations. The enhanced conservation value of the pre-determined preserve system would result from the adherence to detailed criteria regarding the size, shape, location, and composition of preserve lands in the system. These criteria would target the largest contiguous blocks of the highest quality habitats, minimize the effects of adjacent land uses, and strive for connectivity with other important habitats. In comparison, a similar acreage of protected land achieved through individual ESA authorizations would likely result in a system of small, scattered, and isolated preserves with inconsistent management and monitoring practices.

The Moderate Preserve/Limited Take alternative would protect key areas of potential habitat in the county from future land development, thereby decreasing the threat of habitat loss for the most important areas of potential golden-cheeked warbler habitat in Hays County. However, the overall size of the preserve system would be modest. Therefore, the preserve system would be likely to have a minor beneficial impact on golden-cheeked warbler habitats. While it is difficult to predict precisely how golden-cheeked warbler populations would be affected by the protection of the 3,000-acre preserve, it is unlikely that this modestly sized preserve system would have substantial influence (either beneficially or adversely) on the size of the regional or local golden-cheeked warbler populations. With regard to recovery goals, the likely beneficial aspects of the detailed preserve design criteria (particularly with respect to mainlining habitat connectivity across the landscape) would also be tempered by the relatively modest size of the preserve system. Therefore, this alternative is not likely to have substantial influence on the ability of recovery goals being met.

Overall, the Moderate Preserve/Limited Take alternative is likely to result in only minor beneficial impacts to the golden-cheeked warbler.

#### 5.5.1.4 Golden-cheeked Warbler Impacts – Alternative D (Large-scale Preserve System)

The overall impact of the Large-scale Preserve System alternative would likely be moderately beneficial for the golden-cheeked warbler in a regional and local context.

Like Alternative C, the Large-scale Preserve system alternative would create a pre-determined preserve system for the covered species that would be would be designed and managed to maximize the conservation value of the protected lands. In accordance with state

law, this pre-determined preserve system would also have to be completed with four years of permit issuance. Under this alternative, the preserve system would include approximately 30,000 acres, and most of this acreage would be high quality golden-cheeked warbler habitat.

In return for the commitment to acquire a very large-scale, well-designed, and appropriately managed preserve system that met the identified criteria (comparable to the Balcones Canyonlands Preserve in Travis County), Hays County would be authorized to incidentally take all of the remaining areas of golden-cheeked warbler habitat outside of the target acquisition area. The County would be able to permit incidental take associated with the loss or degradation of the remaining approximately 140,000 acres of potential golden-cheeked warbler habitat in Hays County.

While the amount of potential habitat loss authorized under this alternative would far exceed the amount of habitat protected, the general quality of vulnerable habitat would likely be lower than the general quality of protected habitats. It is also likely that much of the 140,000 acres of potential golden-cheeked warbler habitat that could be subject to loss under this alternative would occur in small, fragmented patches with a low probability of occupancy, while most of the important, high quality habitats would be included in the preserve system. Therefore, the potentially adverse impact of the discrepancy between the acres of take and mitigation would likely be minor. For instance, only approximately 50,000 acres of potential golden-cheeked warbler habitat identified by the Loomis model has a probability of occupancy that exceeds 50 percent (see Section 4.5.1.3), and much of this habitat would likely be included in the preserve system. Considering that most of the potential golden-cheeked warbler habitat with a relatively high likelihood of occupancy would be protected in perpetuity, the overall impact of this alternative on the golden-cheeked warbler could be moderately beneficial, since the threats to a large portion of the important habitat in the county would be alleviated.

The Large-scale Preserve System alternative would have the potential to increase the local population of golden-cheeked warblers in Hays County, since the preserve system would include long term management that would likely increase the quality protected habitats over time. Further, a 30,000-acre, pre-determined preserve system would also likely help achieve recovery goals for the golden-cheeked warbler by preserving and/or enhancing habitat connectivity across the landscape.

The overall impact of the Large-scale Preserve System alternative would likely be moderately beneficial for the golden-cheeked warbler in a regional and local context.

### 5.5.2 Black-capped Vireo

Impacts to the black-capped vireo would be considered significant if they were to result in one or more of the following:

- The existing primary threats to the shrubland habitat used by the species would decrease (a beneficial impact) or increase (an adverse impact) to a substantial degree.
- The size of the local black-capped vireo population in Hays County would substantially increase (a beneficial impact) or substantially decrease (an adverse impact).
- The goals and objectives of the black-capped vireo recovery plan were furthered or met (a beneficial impact) or were precluded from being met (an adverse impact).

#### 5.5.2.1 Black-capped Vireo Impacts – Alternative A (No Action)

Under the No Action alternative, the recent trends affecting the black-capped vireo would be expected to continue through the next 30 years. Few records exist for the black-capped vireo in Hays County and little is known about its current status in the county. However, range-wide conditions for the species appear to be improving. The recent 5-year status review for the black-capped vireo (USFWS 2007b) suggests that even with substantial increases in urban development over portions of the species' range in Texas, the size of the known black-capped vireo population has dramatically increased since the species was listed as federally endangered in 1987.

The 2007 status review found that habitat loss and fragmentation due to the conversion of rangeland to other uses has likely decreased the amount of available habitat for the black-capped vireo across Texas. In Hays County, developed land uses are increasing across the landscape, which is likely resulting in some loss of habitat for the black-capped vireo. As described in Section 5.2 of the Hays County RHCP, the County anticipates that approximately 3,300 acres of potential black-capped vireo habitat could be impacted by new land development activities in Hays County during the term of the Permit. However, land cover changes tracked by the USGS suggest that large areas of forest cover are also being converted to more open grassland or shrubland habitats, which over time could create more habitat for the species. Therefore, given the lack of specific information regarding the status of the black-capped vireo in Hays County, it is uncertain the extent to which land use changes and other regional trends would be expected to adversely or beneficially affect the species (both in terms of habitat availability and population size) under the No Action alternative.

Regardless of the overall impacts of land use changes in Hays County, any loss or degradation of occupied black-capped vireo habitat in the county would require authorization from the Service to proceed in compliance with the ESA. While the impacts and mitigation likely to occur under the No Action alternative are difficult to predict due to the lack of information regarding the precise location and nature of future land development in the County, the lack of reliable information regarding the status of the species in Hays County, and the

inability to predict the level of compliance with the ESA, it may be assumed that some conservation efforts for the species would take place. ESA authorization would include the requirement that any occupied black-capped vireo habitat that was disturbed or removed be mitigated for by some form of compensation. Frequently, mitigation for habitat loss or degradation involves the permanent protection and management of habitat. The benefit to the species from habitat protection resulting from individual ESA authorizations under the No Action alternative is likely to be negligible to minor, since compliance would likely be relatively low (there have been no ESA Section 10(a) permits issued for the black-capped vireo in Hays County) and mitigation from individual projects is likely to protect relatively small and scattered or isolated patches of habitat.

The recovery criteria listed in the 1991 Recovery Plan for the black-capped vireo included a call for the protection of at least one viable black-capped vireo population composed of at least 500 to 1000 breeding pairs in each of six recovery regions in Texas, Oklahoma, and Mexico. It is not clear whether a viable black-capped vireo population is currently protected in the recovery region that includes Hays County, although the 2006 status review by Wilkins et al. (2006) identified 1,018 recent black-capped vireo observations in the Edwards Plateau recovery region. Most of these records were from protected lands, such as state parks and wildlife management areas. Since the true status of the black-capped vireo in Hays County and the recovery region is unknown, it is uncertain whether the No Action alternative would promote or prohibit the attainment of recovery goals for the species.

#### 5.5.2.2 Black-capped Vireo Impacts – Alternative B (Proposed Hays County RHCP)

The proposed Hays County RHCP is likely to result in a minor to moderate beneficial impact to the black-capped vireo, compared to the No Action alternative.

Under the proposed RHCP, the County would receive authorization to incidentally take black-capped vireos related to the loss or degradation of up to 1,300 acres of potential black-capped vireo habitat in Hays County over 30 years. To mitigate for those impacts, the County would create a preserve system under a phased conservation bank approach, with a target size of approximately 10,000 to 15,000 acres. The bank would be assembled on a phased basis as needed over the next 30 years to provide sufficient mitigation credits to offset impacts from participating public and private projects. Under the phased conservation bank approach, habitat protection would always occur in advance of authorized impacts through the RHCP; however, no pre-determined preserve system would be designated under the RHCP. The County estimates that by the end of the 30-year permit term, approximately 1,300 acres would be managed in perpetuity for the benefit of the black-capped vireo.

As explained in Section 4.1, the Hays County RHCP would be implemented in the same socioeconomic context as the No Action alternative and would experience similar levels and patterns of land development. Accordingly, anticipated land development activities in the county would be expected to have similar potentially adverse effects to the species as described

for the No Action alternative. Since implementation of the proposed RHCP would not be expected to substantially influence the total amount of anticipated habitat loss in Hays County during the permit term, the impacts of the proposed RHCP on the black-capped vireo would be primarily associated with the mitigation provided by the plan.

Black-capped vireo mitigation credits under the proposed RHCP would be awarded to the County by the Service based on the number of acres dedicated to perpetual black-capped vireo habitat management within the preserve system. The mitigation needs of projects seeking to authorize impacts to the covered species through the RHCP would be determined by the County based on an on-site assessment of habitat conditions and site-specific development plans. Typically one acre of impact to potential black-capped vireo habitat within a participating project area would require the use of one mitigation credit from the RHCP conservation bank. Therefore, it is anticipated that impacts to habitat authorized through the RHCP will be adequately balanced by perpetually managed black-capped vireo habitat within the preserve system.

Areas protected and managed for the benefit of the black-capped vireo under the proposed RHCP would be would likely be larger than the mitigation typically needed to offset impacts associated with individual projects, these areas would be regularly managed and monitored in accordance with a Service-approved plan that addresses the maintenance of appropriate vegetative structure for the black-capped vireo and reduces threats from nest parasites and browsing wildlife, and the black-capped vireo management areas would be buffered from the effects of adjacent land uses by being located within a larger system of preserve lands.

Therefore, the mitigation provided under the proposed RHCP would be expected to alleviate some of the major threats to the species for up to 1,300 acres of black-capped vireo habitat in Hays County, thereby providing a moderate benefit to the species in Hays County, compared to the No Action alternative. However, these expected benefits could be minor on a regional scale due to the somewhat limited scope of this alternative and the presence of several other protected areas with recently observed black-capped vireo populations elsewhere within the recovery region (i.e., state parks and wildlife management areas within the Edwards Plateau recovery region). Similarly, the proposed RHCP in Hays County would be expected to have only minor beneficial effects on the prospect for attaining recovery goals for the black-capped vireo.

Overall, the proposed Hays County RHCP is likely to result in a minor to moderate beneficial impact to the black-capped vireo, compared to the No Action alternative

#### 5.5.2.3 Black-capped Vireo Impacts – Alternative C (Moderate Preserve/Limited Take)

The Moderate Preserve/Limited Take alternative would authorize the loss or degradation of approximately 3,600 acres of potential habitat for the covered species (both the golden-cheeked warbler and the black-capped vireo) within Hays County associated with public and private land development activities. For the purpose of this EIS, it is assumed that a small

portion of this authorized impact (perhaps 5 to 10 percent) could be expected to affect the black-capped vireo. As mitigation, the County would collect mitigation fees from plan participants and acquire at least 3,000 acres of preserve system that would likely contain between 100 and 300 acres of shrubland to be managed in perpetuity as black-capped vireo habitat.

It is possible that the Moderate Preserve/Limited Take alternative would increase the amount of ESA compliance in Hays County, compared with the No Action alternative, since compliance may be more efficient than obtaining individual authorization through the Service. This may be particularly true with regard to the black-capped vireo, since individual ESA permittees could be required to engage in long-term obligations for regular black-capped vireo habitat management activities that could make a one-time payment to a regional plan an attractive alternative to an individual permit. However, the potential benefits of increased ESA compliance would be limited by the modest level of incidental take authorization available under this alternative.

As described above, issuing an incidental take permit under the Moderate Preserve/Limited Take alternative is not an "indispensable prerequisite" or an "essential catalyst" for land development in Hays County, and implementing this alternative regional HCP would not enable or impede future land development because alternative means of compliance with the ESA are available. Therefore, the potentially adverse impacts of this alternative would be similar to those described for the No Action alternative. The remaining impacts of this alternative on the black-capped vireo would be primarily associated with the 100 to 300 acres of black-capped vireo management area designated within the 3,000-acre preserve system.

Impacts to potential black-capped vireo habitat (as identified through on-site habitat assessments) would typically be mitigated at a ratio of one acre of mitigation for each acre of impact. The mitigation provided under the Moderate Preserve/Limited Take alternative would be provided in relatively large blocks of at least 50 acres within portions of the preserve system that are not managed as golden-cheeked warbler habitat. This alternative would create black-capped vireo management areas that would be larger than the mitigation typically needed to offset impacts associated with individual projects. Black-capped vireo habitat within the preserve system would also be regularly managed and monitored in accordance with a Service-approved plan that addresses the maintenance of appropriate vegetative structure for the black-capped vireo and reduces threats from nest parasites and browsing wildlife. Further, the black-capped vireo management areas under this alternative would be buffered from the effects of adjacent land uses by being located within a larger system of preserve lands (typically in blocks of at least 500 acres).

Therefore, the mitigation provided under the Moderate Preserve/Limited Take alternative would be expected to alleviate some of the major threats to the species for a moderately sized area of black-capped vireo habitat, thereby providing a minor benefit to the species in Hays County, compared to the No Action alternative. Although, these expected

benefits could be negligible on a regional scale due to the limited scope of this alternative and the presence of much larger protected areas with recently observed black-capped vireo populations elsewhere within the recovery region (i.e., state parks and wildlife management areas within the Edwards Plateau recovery region). Similarly, the Moderate Preserve/Limited Take alternative in Hays County would be expected to have only negligible effects (beneficial or adverse) on the prospect for attaining recovery goals for the black-capped vireo.

#### 5.5.2.4 Black-capped Vireo Impacts – Alternative D (Large-scale Preserve System)

The overall impact of the Large-scale Preserve System would likely be moderately beneficial for the black-capped vireo in a regional and local context.

The Large-scale Preserve System alternative uses a pre-determined preserve system that would be designed to include approximately 30,000 acres of high quality habitats for the covered species in Hays County. It is likely that some of these preserve lands would include tracts with the occupied black-capped vireo habitat and/or areas with the promise for developing into high quality black-capped vireo habitat with proper management. Assuming that approximately 5 to 15 percent of the preserve system would be dedicated to black-capped vireo habitat management, approximately 1,500 acres to 4,500 acres in Hays County could be perpetually managed as high quality black-capped vireo habitat. Under this alternative, the remaining acres of potential black-capped vireo habitat in Hays County (approximately 19,000 to 22,000 acres) could be incidentally taken.

While the amount of potential habitat loss authorized under this alternative would far exceed the amount of habitat protected, the general quality of vulnerable habitat would likely be much lower than the general quality of protected habitats, and most vulnerable habitats would lack appropriate management activities to maintain suitable habitat conditions over time. Therefore, the potentially adverse impact of the authorized take would be balanced by a perpetual commitment to manage thousands of acres for the benefit of the black-capped vireo.

It is likely that the Large-scale Preserve System alternative would increase the amount of compliance with the ESA with regard to the covered species, including the black-capped vireo, since the time and cost of compliance would be reduced for project proponents compared to individual ESA authorizations through the Service and the alternative would include education and outreach programs to increase awareness of endangered species issues in the county. As a result, more of the anticipated habitat loss would likely be mitigated for than under the No Action alternative.

The Large-scale Preserve System alternative would have the potential to increase the local and regional populations of black-capped vireos in Hays County, since the preserve system would include regular habitat management activities that would likely increase the quality protected habitats, increase the likelihood that these managed habitats would be occupied by the species, and increase the abundance of the black-capped vireo in Hays County over time. Further, a 30,000-acre, pre-determined preserve system containing 1,500 to 4,500 acres of high

quality black-capped vireo habitat would also likely help achieve recovery goals for the black-capped vireo by contributing to a viable and self-sustaining population of approximately 500 to 1,000 breeding pairs.

The overall impact of the Large-scale Preserve System would likely be moderately beneficial for the black-capped vireo in a regional and local context.

## 5.6 Hays County RHCP Evaluation and Additional Species

In addition to the covered species, for which the County would obtain incidental take authorization, the proposed Hays County RHCP addresses two other categories of rare and/or sensitive species termed "evaluation" or "additional" species.

The set of evaluation species includes 40 karst species, including a variety of cave-adapted snails, crustaceans, arachnids, beetles, salamanders, a flatworm, a springtail, and a leech. None of the evaluation species are listed as federally threatened or endangered; nor have they been officially identified as candidates for such listing. However, several of the evaluation species have been petitioned for listing (see Table 4-6) and one or more of these species could become federally listed during the term of the permit. Hays County is not currently seeking ESA incidental take authorization for any of the evaluation species; nevertheless, the evaluation species may benefit from the conservation measures identified in the proposed RHCP.

The additional species addressed in the RHCP include a group of 16 plants, mollusks, insects, amphibians, and a fish. Most of these species utilize surface aquatic habitats, but some are adapted to aquatic karst habitats (such as spring outlets and underground aquifers) and others utilize upland habitats. Some of the additional species are currently listed as Federally threatened or endangered, including Texas wild-rice, the Comal Springs riffle beetle, the Comal Springs dryopid beetle, the fountain darter, the San Marcos Springs salamander, and the Texas blind salamander. Although not yet determined, the unidentified *Eurycea* salamander found in northern Hays County could also be a member of a listed species. All of the federally listed additional species are associated with aquatic habitats that are highly dependent on spring flow from the Edwards Aquifer at the San Marcos Springs. Hays County is not currently seeking ESA incidental take authorization for any of the additional species; nevertheless, the additional species may benefit from the conservation measures identified in the proposed RHCP.

The indicators of impact significance differ for different groups of these 56 evaluation and additional species and will be discussed in the appropriate sections below. The definitions of impact intensity, however, are similar for these two groups of species and are as follows:

Negligible: Changes to the existing primary threats to the evaluation or additional species, their habitats, or the natural processes sustaining them would be at the lowest levels of detection. Changes in distribution would be minimal and well within the range of natural variation. For listed species, negligible effects would equate with a "may effect, not likely to

adversely affect" determination by the U.S. Fish and Wildlife Service under the ESA.

Minor: Changes to the existing primary threats to the evaluation or additional species, their habitats, or the natural processes sustaining them would be detectable, but short-term and/or spatially limited in scope. Changes in distribution would not be expected to greatly exceed the range of natural variability. For listed species, minor effect would equate with a "may effect, not likely to adversely affect" determination by the U.S. Fish and Wildlife Service under the ESA.

Moderate: Changes to the existing primary threats to the evaluation or additional species, their habitats, or the natural processes sustaining them would be readily detectable over relatively wide areas of the county. Impacts could result in direct mortality and/or interference with activities necessary for survival, but would not be expected to threaten the continued existence or distribution of the species in the County. For listed species, moderate effect would equate with a "may effect, likely to adversely affect" determination by the U.S. Fish and Wildlife Service.

Major: Changes to the existing primary threats to the evaluation or additional; species, their habitats, or the natural processes that sustain them would be readily detectable over most areas of the county and would be outside of the range of natural variability for long periods of time or be permanent. For listed species, major effect would equate with a "may effect, likely to adversely affect" or a jeopardy determination by the U.S. Fish and Wildlife Service under the ESA.

### 5.6.1 Unlisted Evaluation Species Utilizing Terrestrial Karst Habitats

The species included in this group utilize terrestrial (or dry) underground habitats, and include the following evaluation species:

| Common Name | Scientific Name | Taxa |
|---|---|---|
| a cave-obligate spider | *Cicurina ezelli* | Arachnids |
| a cave-obligate spider | *Cicurina russelli* | Arachnids |
| a cave-obligate spider | *Cicurina ubicki* | Arachnids |
| undescribed cave-obligate spider | *Eidmannella* n. sp. | Arachnids |
| undescribed cave-obligate spider | *Neoleptoneta* n. sp. 1 | Arachnids |
| undescribed cave-obligate spider | *Neoleptoneta* n. sp. 2 | Arachnids |
| undescribed cave-obligate spider | *Neoleptoneta* n. sp. eyeless | Arachnids |
| a pseudoscorpion | *Tartarocreagris grubbsi* | Arachnids |
| a cave-obligate harvestman | *Texella diplospina* | Arachnids |

| Common Name | Scientific Name | Taxa |
|---|---|---|
| a cave-obligate harvestman | *Texella grubbsi* | Arachnids |
| a cave-obligate harvestman | *Texella mulaiki* | Arachnids |
| a cave-obligate harvestman | *Texella renkesae* | Arachnids |
| a cave-obligate springtail | *Arrhopalites texensis* | Hexapods |
| an ant-like litter beetle | *Batrisodes grubbsi* | Insects |
| a cave-obligate beetle | *Rhadine austinica* | Insects |
| a cave-obligate beetle | *Rhadine insolita* | Insects |
| undescribed beetle | *Rhadine* n. sp. (*subterranea* group) | Insects |
| undescribed beetle | *Rhadine* n. sp. 2 (*subterranea* group) | Insects |

Impacts to the terrestrial karst evaluation species would be considered significant if they were to result in the following:

- The existing primary threats to these species would decrease (a beneficial impact) or increase (an adverse impact) to a substantial degree.
- An increase in the distribution of these species indicated sufficient resource conservation (a beneficial impact) or a decline in distribution indicated insufficient resource conservation (an adverse impact).

5.6.1.1 Unlisted Terrestrial Karst Evaluation Species Impacts – Alternative A (No Action)

Approximately 139,870 acres of Hays County are underlain by geologic formations that are known to develop karst features. One or more of the unlisted terrestrial karst evaluation species have been observed in 18 of the approximately 301 caves, sinkholes, springs, and other karst features are currently known to occur in Hays County. Approximately two of these "occupied" karst features occur on currently protected lands in the county, while the remaining locations are located on unprotected private lands. However, few systematic karst surveys have been completed in Hays County, and given the extent of karst geology in Hays County it is likely that many more karst features (including features that could contain one or more of the evaluation species) are present across the landscape than are currently known.

Karst habitats are extremely sensitive to degradation from human activities. As described in Section 4.6.1, most of the terrestrial karst evaluation species have a limited known distribution, and their primary threat is destruction or degradation of habitat. Impacts to terrestrial karst species resulting from land development activities could be associated with actions such as filling and collapsing caves, alteration of surface drainage patterns and groundwater flow, alteration of surface plant and animal communities, contamination from pollutants, human visitation and vandalism, and activities associated with mining and quarrying. Non-native, invasive species, such as red imported fire ants, also enter caves, eat native arthropods, and could compete indirectly with foraging cave crickets (USFWS 2008).

Over the next 30 years, projected population increases and associated increases in developed land uses would be expected to affect thousands of acres of currently undisturbed portions of Hays County that could contain potential karst habitats. While it is impossible to predict the number of caves and karst features that would be adversely affected by future development activities, it is not unreasonable to assume that known and unknown karst features would be destroyed or substantially degraded by encroaching development. Even if many more caves and other karst features are discovered across the landscape, the destruction or degradation of karst habitats could result in adverse impacts to the one or more of the terrestrial karst evaluation species.

Currently, none of the terrestrial karst evaluation species are protected by the ESA and, therefore, there are no protective mechanisms specific to these species. The TCEQ enforces the Edwards Aquifer Rules, which address water quality protection and apply to certain types of development projects over the Edwards Aquifer contributing, recharge, and transition zones (i.e., all of the area of potential effect considered in this EIS). Some provisions of the Edwards Aquifer Rules require the creation of buffer zones around karst features. However, this regulatory program does not alleviate most of the threats contributing to the loss or degradation of terrestrial karst habitats. Due to the general sensitivity of karst habitats (as described above) and the limited known distribution of many of these species (several are known from only a single location), increases in land development across the county could ultimately cause a decline in the numbers and range of one or more of these potentially rare species.

Overall, the Service generally lacks sufficient information on the distribution, abundance, life history, and specific habitat requirements of these unlisted terrestrial karst species to make a determination of likely impacts under the No Action alternative.

#### 5.6.1.2 Unlisted Terrestrial Karst Evaluation Species Impacts – Alternative B (Proposed Hays County RHCP)

As for the No Action alternative, terrestrial karst evaluation species in Hays County would likely suffer adverse impacts from habitat loss or degradation resulting from expected increases in developed land uses over the next 30 years; however, the extent or significance of these potential adverse effects is uncertain due to the scarcity of information pertaining to these species.

While the proposed Hays County RHCP would not cover the terrestrial karst evaluation species for incidental take under the ESA (and such coverage is not currently needed for these unlisted species), the RHCP conservation program would be likely to incidentally protect habitats for one or more of these species within the preserve system. The proposed RHCP would also promote the voluntary conservation of the terrestrial karst evaluation species through education and outreach programs and would fund research to increase the body of knowledge regarding their biology and conservation.

The potentially beneficial effects of incidental habitat protection for the terrestrial karst evaluation species under the proposed RHCP could vary from negligible to major. For example, if the preserve system contained few or no karst habitats known to be occupied by the evaluation species, then the benefits of the preserve system on these species would be negligible. On the other end of the scale, the benefits could be major if the preserve system included (and permanently protected) the only known localities for one or more of these potentially rare species. Since the RHCP preserve system would be assembled on a rolling basis, it is not possible to determine the true level of benefit that these species would receive.

Therefore, the preserve system, education and outreach program, and research funding proposed as part of the Hays County RHCP would likely have minor to major beneficial effects on the unlisted, terrestrial karst evaluation species, compared with the effects of the No Action alternative. The magnitude of this potentially beneficial effect could vary from minor to major, depending on the how many karst features were incidentally protected within the preserve system over time and the particular species occupying those features.

#### 5.6.1.3 Unlisted Terrestrial Karst Evaluation Species Impacts – Alternative C (Moderate Preserve/Limited Take)

Under the Moderate Preserve/Limited Take alternative, the current trends regarding land development and possible impacts to karst habitats described for the No Action alternative would be expected to continue, and it is likely that adverse impacts to one or more of the terrestrial karst evaluation species would occur (primarily through loss or degradation of habitat). This alternative would not cover the terrestrial karst evaluation species for incidental take under the ESA; indeed, no such coverage is needed since none of these species are federally listed. The alternative could, however, incidentally benefit one or more of these species by protecting approximately 3,000 acres in Hays County from future land development. While the preserve system under the Moderate Preserve/Limited Take alternative would be designed to include high quality habitats for the covered species, these habitats can occur in areas that are likely to contain karst features as well. By protecting large blocks of undeveloped land, it is likely that the preserve system would also protect caves or other karst features that are occupied by one or more of the terrestrial karst evaluation species.

The effect of this incidental conservation would likely be negligible to minor for most of the terrestrial karst evaluation species, since the overall scale of the preserve system is relatively modest and the protection of these species would not be a primary consideration in the design of the preserve system. However, if the preserve system did contain occupied habitat for one or more of the species currently known from only a single site in Hays County, the effects of protecting that habitat could be significant for that species.

In addition to the possible incidental protection of terrestrial karst habitats within the 3,000-acre preserve system, the conservation program under the Moderate Preserve/Limited Take alternative would also include education and outreach programs to increase awareness of

endangered species issues in Hays County. These programs would also address issues related to the conservation of karst habitats and promote the use of voluntary measures to conserve karst habitats.

Therefore, while it is difficult to predict the true impact of this alternative on these species, it is likely that implementation of the Moderate Preserve/Limited Take alternative would have a beneficial effect on the unlisted, terrestrial karst evaluation species, compared to the No Action alternative. The magnitude of this potentially beneficial effect could vary from minor to major, depending on the how many karst features were incidentally protected and the particular species occupying those features.

#### 5.6.1.4 Unlisted Terrestrial Karst Evaluation Species Impacts – Alternative D (Large-scale Preserve)

As described for the No Action alternative, anticipated new land development in Hays County could result in the loss or degradation of karst habitats and could adversely affect one or more of the terrestrial karst evaluation species. However, under the Large-scale Preserve System, approximately 30,000 acres of habitat for the golden-cheeked warbler or black-capped vireo would be protected within a pre-determined preserve system within the first several years of the plan. Even though this alternative would also not seek to cover the terrestrial karst evaluation species for incidental take, there would be a high likelihood that some karst habitats and some of the currently known karst features occupied by one or more of the evaluation species could be included in this preserve system. The preserve system could also include some currently unknown karst features that provide habitat for one or more of the terrestrial karst evaluation species. Therefore, given the size of the proposed preserve system, it is likely that the Large-scale Preserve System alternative would incidentally result in a minor to major beneficial impact for one or more of the terrestrial karst evaluation species, compared to the No Action alternative.

### 5.6.2 Unlisted Evaluation Species Utilizing Aquatic Karst Habitats

The species included in this group utilize aquatic underground habitats (such as aquifers and spring outlets), and include the following evaluation species:

| Common Name | Scientific Name | Taxa |
|---|---|---|
| Aquifer flatworm | *Sphalloplana mohri* | Turbellarians |
| Flattened cavesnail | *Phreatodrobia micra* | Mollusks |
| Disc cavesnail | *Phreatodrobia plana* | Mollusks |
| High-hat cavesnail | *Phreatodrobia punctata* | Mollusks |
| Beaked cavesnail | *Phreatodrobia rotunda* | Mollusks |
| a cave-obligate leech | *Mooreobdella* n. sp. | Hirudinea |
| a cave-obligate crustacean | *Tethysbaena texana* | Crustaceans |
| a cave-obligate amphipod | *Allotexiweckelia hirsuta* | Crustaceans |

| | | |
|---|---|---|
| a cave-obligate amphipod | *Artesia subterranea* | Crustaceans |
| a cave-obligate amphipod | *Holsingerius samacos* | Crustaceans |
| a cave-obligate amphipod | *Seborgia relicta* | Crustaceans |
| Balcones cave amphipod | *Stygobromus balconis* | Crustaceans |
| Ezell's cave amphipod | *Stygobromus flagellatus* | Crustaceans |
| a cave-obligate amphipod | *Texiweckelia texensis* | Crustaceans |
| a cave-obligate amphipod | *Texiweckeliopsis insolita* | Crustaceans |
| Texas troglobitic water slater | *Lirceolus smithii* | Crustaceans |
| a cave-obligate decapod | *Calathaemon holthuisi* | Crustaceans |
| Balcones cave shrimp | *Palaemonetes antrorum* | Crustaceans |
| Comal Springs diving beetle | *Comaldessus stygius* | Insects |
| Edwards Aquifer diving beetle | *Haideoporus texanus* | Insects |
| Blanco River Springs salamander | *Eurycea pterophila* | Amphibians |
| Blanco blind salamander | *Eurycea robusta* | Amphibians |

Impacts to the aquatic karst evaluation species would be considered significant if they were to result in the following:

- The existing primary threats to these species would decrease (a beneficial impact) or increase (an adverse impact) to a substantial degree.
- An increase in the distribution of these species indicated sufficient resource conservation (a beneficial impact) or a decline in distribution indicated insufficient resource conservation (an adverse impact).

5.6.2.1 Unlisted Aquatic Karst Evaluation Species Impacts – Alternative A (No Action)

Most of the aquatic karst evaluation species are restricted to the Edwards Aquifer; although a few (such as *Comaldessus stygius*, *Stygoparnus comalensis*, and *Eurycea pterophila*) are known to occur in the underground, water-filled passages and spring outlets of the Trinity Aquifer. Under the No Action alternative, all or most of the unlisted, aquatic karst evaluation species could experience moderate adverse impacts related to projected increases in human population and associated land use changes in Hays County over the next 30 years.

The aquatic karst ecosystem relies on the natural quantity and quality of water flowing through the system and the energy brought in through caves and other karst features with connections to the surface environment. Aquatic karst environments are highly interconnected and heterogeneous, are characterized by rapid recharge of unfiltered surface water into the subsurface, and typically experience high flow velocities within the system. As described for the terrestrial karst evaluation species, karst terranes are extremely sensitive to degradation from human activities (Ford and Williams 1989, White 1988). In short, a healthy subsurface environment is dependent upon a healthy surface environment.

Water quality has obvious implications for aquatic species. These characteristics make aquifer-dependent species and habitats vulnerable to activities that disturb natural surface environments from both biological and hydrological perspectives (Ford and Williams 1989, White 1988). Poor water quality can mean low levels of dissolved oxygen, increased levels of sediments and/or contaminants, and/or increased levels nutrients that can cause disease, deformities, or death of aquatic organisms.

Changes in surface water flow and/or ground water pumping could alter the amount and pattern of water flow through the aquifer systems, and therefore affect the movement of energy, nutrients, and dissolved oxygen through the system that aquifer organisms rely on. For spring-dependent species, changes in water use could stop spring flows and destroy key habitats. Some spring species might survive short-term flow intermissions by burying into gravels or retreating into the aquifer, but they may not be adapted to living there for long periods.

Over the next 30 years, projected population increases and associated increases in developed land uses would be expected to affect thousands of acres of currently undisturbed portions of Hays County. This land development would replace vegetation with impervious cover associated with buildings, pavement, and similar surfaces. Impervious cover can increase contaminant loads in springs and groundwater, as well as alter local hydrologic regimes by increasing storm runoff and decreasing base flows in drainages (Arnold and Gibbons 1996). Increased stormwater runoff results in a decrease in aquifer recharge, increased variability in water availability and flow, and decreased water quality due to soil erosion and sedimentation. Contaminants carried and stored in sediments can include petroleum hydrocarbons, pesticides, and heavy metals (Hoffman et al. 1995). Decreases in base flow in streams due to land development results in reduced water availability at springs, which can be especially problematic during periods of drought (Price et al. 1995, USFWS 2004b).

While the general relationship between land development, impervious cover, and the degradation of groundwater resources is well established, the level of impact that land development activities in Hays County would have on the quality and quantity of water in the aquifer is difficult to quantify. The Edwards and Trinity aquifers have very large contributing and recharge zones spanning thousands of square miles, and the groundwater under Hays County (which provides habitat for the aquatic evaluation and additional species) is influenced by land and water use patterns across this entire area, not only in Hays County. Land development activities in Hays County (which represents only a small fraction of the total area contributing to the health of the Edwards and Trinity aquifers) could only have a very limited impact on the overall health of these aquifer systems; although more significant localized impacts are possible.

Currently, none of the aquatic karst evaluation species are protected by the ESA and, therefore, there are no protective mechanisms specific to these species. The TCEQ enforces the Edwards Aquifer Rules, which address water quality protection and apply to certain types of

development projects over the Edwards Aquifer contributing, recharge, and transition zones (i.e., all of the area of potential effect considered in this EIS). Other local water quality regulations are also enforced across portions of the area of potential effects. However, these regulatory programs are likely to provide only negligible to minor beneficial impacts to the aquatic karst evaluation species since they do not address issues pertaining to water quantity. Therefore, due to the general sensitivity of aquatic karst habitats (as described above) and the limited known distribution of many of these species (several are known from only a single location), it is expected that increases in land development across the county could ultimately cause a decline in the numbers and range of one or more of these potentially rare species.

Overall, the Service generally lacks sufficient information on the distribution, abundance, life history, and specific habitat requirements of these unlisted aquatic karst species to make a determination of likely impacts under the No Action alternative.

#### 5.6.2.2 Unlisted Aquatic Karst Evaluation Species Impacts – Alternative B (Proposed Hays County RHCP)

The proposed Hays County RHCP could result in negligible to major beneficial impacts to the aquatic karst evaluation species.

As for the No Action alternative, the adverse impacts of anticipated land development activities in Hays County would likely be negligible to minor for most the aquatic karst species, since habitats for these species depend on land and water use patterns across a large portion of Texas, not just activities in Hays County. However, significant local impacts could also be possible if particular development projects destroyed or degraded occupied spring outlets or important recharge features.

The preserve system created under the proposed RHCP would be expected to protect approximately 10,000 to 15,000 acres in Hays County from future land development. By protecting large blocks of undeveloped land, it is possible that the preserve system would also protect springs and other karst features that are occupied by or one or more of the aquatic karst evaluation species. It is also possible that at least some of the preserve land would protect recharge features that allow surface water to replenish the aquifer. Protection of natural vegetation around recharge features contributes to maintaining water quality in the aquifers.

The effect of conservation actions under the RHCP would likely be negligible to minor for most of the aquatic karst evaluation species, since the overall scale of the preserve system is relatively modest with respect to the area of the recharge and contributing zones of the aquifers that provide habitat for these species (i.e., the overall health of the aquifer systems is dependent upon a much larger area than Hays County). However, if the preserve system included important spring outlets or recharge features that contributed directly to the known habitat of one or more of the aquatic evaluation species, then the beneficial effects of protecting that habitat could be significant for that species.

In addition to the possible protection of aquatic karst habitats (i.e., springs, caves, or similar local features) within the preserve system, the conservation program under the proposed RHCP would also include education and outreach programs to increase awareness of endangered species issues in Hays County. These programs would discuss issues related to the conservation of karst habitats and promote the use of voluntary measures to conserve karst habitats and water resources. Further, the County would voluntarily commit funds for new research to better understand the distribution, abundance, biology of one or more of the RHCP evaluation species and help develop effective management practices to conserve them.

Therefore, the preserve system, education and outreach programs, and research funds that would be implemented under the proposed RHCP would likely have beneficial effects on the aquatic karst species. Since the ultimate size and location of the preserve system is not known at this time, it is uncertain how many locally important springs or recharge features would be protected. However, it is likely that some of the aquatic karst species would benefit from the creation of the preserve system. While the overall beneficial effects of the proposed RHCP (compared to the No Action alternative) would likely be negligible to minor for most of the aquatic karst species, some species could experience moderate to major beneficial effects depending on the specific features of the preserve system.

#### 5.6.2.3 Unlisted Aquatic Karst Evaluation Species Impacts – Alternative C (Moderate Preserve/Limited Take)

Under the Moderate Preserve/Limited Take alternative, the current trends regarding land development and possible impacts to aquatic karst habitats described for the No Action alternative would be expected to continue, and it is likely that adverse impacts to one or more of the aquatic karst evaluation species would occur (primarily through loss or degradation of habitat). This alternative would not cover the aquatic karst evaluation species for incidental take under the ESA; indeed, no such coverage is currently needed since none of these species is federally listed.

Nevertheless, the Moderate Preserve/Limited Take alternative could incidentally benefit one or more of these species with the creation of an approximately 3,000-acre preserve system in Hays County. By protecting large blocks of undeveloped land, it is possible that the preserve system would also protect springs and other karst features that are occupied by or one or more of the aquatic karst evaluation species. It is also possible that at least some of the 3,000 acres of preserve land would protect recharge features that allow surface water to replenish the aquifer. Protection of natural vegetation around recharge features contributes to maintaining water quality in the aquifers.

As described for Alternative B, the effect of this incidental conservation would likely be negligible to minor for most of the aquatic karst evaluation species. However, if the preserve system included important spring outlets or recharge features that contributed directly to the

known habitat of one or more of the aquatic evaluation species, then the effects of protecting that habitat could be significant for that species.

The Moderate Preserve/Limited Take alternative would also include education and outreach programs to increase awareness of endangered species issues in Hays County and promote the use of voluntary measures to conserve karst habitats and water resources.

Therefore, while it is difficult to predict the true impact of this alternative on the aquatic karst species, it is likely that implementation of the Moderate Preserve/Limited Take alternative would have a beneficial effect on the unlisted, aquatic karst evaluation species, compared to the No Action alternative. The magnitude of this potentially beneficial effect could vary from negligible to major, depending on the local importance of any springs and recharge features that would be incidentally protected and the particular species occupying those features.

#### 5.6.2.4 Unlisted Aquatic Karst Evaluation Species Impacts – Alternative D (Large-scale Preserve)

Under the Large-scale Preserve System, approximately 30,000 acres of prime habitat for the golden-cheeked warbler or black-capped vireo would be protected within a pre-determined preserve system within the first several years of the plan. Even though this alternative would not seek to cover the aquatic karst evaluation species for incidental take, there would be a high likelihood that many important springs and recharge features known in Hays County would be included in this large preserve system. Therefore, given the size of the proposed preserve system, it is likely that the Large-scale Preserve System alternative would incidentally result in a minor to moderate beneficial impact for one or more of the aquatic karst evaluation species relative to the No Action alternative.

### 5.6.3 Additional Species

The category of additional species includes three upland plants, eight aquatic species that utilize surface water habitats, and five species that utilize aquatic karst habitats. Some of these additional species are listed as threatened or endangered, including Texas wildrice, Comal Springs riffle beetle, Comal Springs dryopid beetle, fountain darter, San Marcos salamander, Texas blind salamander, and (possibly, pending additional study) the undescribed northern Hays County Eurycea salamander. Impacts to the additional species would be considered significant if they were to result in the following:

- The existing primary threats to these species would decrease (a beneficial impact) or increase (an adverse impact) to a substantial degree.
- An increase in the distribution of these species indicated sufficient resource conservation (a beneficial impact) or a decline in distribution indicated insufficient resource conservation (an adverse impact).

#### 5.6.3.1 Additional Species Impacts – Alternative A (No Action)

The three upland plant species included in the list of additional species are each currently considered to be rare, with relatively few known populations as described in Section 4.6.2. None of these upland plants are threatened or endangered under the ESA. Habitat loss from land development activities, overgrazing from domestic animals or wildlife, and competition from invasive and/or non-native plants may all be substantial threats to these species. Under the No Action alternative, anticipated human population increases would be expected to result in increased land development that would convert undeveloped and relatively natural upland vegetation communities to developed land uses. Increased land development could also lead to the introduction and expansion of populations of non-native plants in adjacent natural areas. While agricultural land uses in Hays County would be expected to decrease over the next 30 years, localized overgrazing and overabundant populations of deer and other wildlife could still be expected. These factors could cause a decline in the Hays County populations of the three upland plant species and/or their known distribution in Texas.

Overall, the anticipated threats to surface and sub-surface aquatic communities that provide habitat for the aquatic additional species would be expected to be similar to that described for the aquatic evaluation species in Section 5.6.2. Land development and increases in impervious cover can lead to the degradation of the quality of water in streams and rivers, as well as changes to the volume and pattern of stream flow. These changes in hydrology would negatively affect surface and subsurface aquatic communities and could cause declines in rare species; particularly when rare species (such as the aquatic additional species) are constrained by very precise habitat requirements. Any actions that would result in take of the listed additional aquatic species would require authorization under Section 10 or Section 7 of the ESA and the impacts of take would be analyzed in detail pursuant to any such authorizations.

Scattered conservation actions, such as would occur under individual ESA authorizations and other public parks or open space initiatives, would also be expected to protect some currently undeveloped areas within Hays County. For example, the City of San Marcos is currently developing a habitat conservation plan for the additional listed aquatic species that occur at San Marcos Springs, Spring Lake, and the upper reaches of the San Marcos River. However, due to the difficulty in predicting the size, number, and location of potential future conservation actions and the wide area contributing to the health of surface and sub-surface aquatic resources in Hays County, it is not possible to predict the extent to which potential future conservation actions would result in beneficial conservation of the additional species.

Overall, it is likely that the additional species would experience negligible to moderate adverse impacts under the No Action alternative.

#### 5.6.3.2 Additional Species Impacts – Alternative B (Proposed Hays County RHCP)

The overall effects of an increasing human population in Hays County, as described for the No Action alternative, would be expected to result in similar adverse effects to the additional species under the proposed RHCP. However, the beneficial conservation actions of the proposed RHCP would likely have negligible to minor beneficial effects for one or more of these species, compared to the No Action alternative.

The proposed RHCP would create a preserve system of approximately 10,000 to 15,000 acres containing potential golden-cheeked warbler and black-capped vireo habitat in Hays County. The three terrestrial plants that are included in the group of additional species also occur in these habitat types, and it is possible that some populations of these plants would be protected by the preserve system and benefit from the management of these habitats. Therefore, the proposed RHCP could have a negligible to moderate beneficial effect on reducing threats to and maintaining the distribution of the three terrestrial plant species.

Since aquatic resources would not be the focus of the preserve system, it is uncertain how many or what types of aquatic resources would be included within the preserve system. The size of the preserve system could also limit the potential water quality benefits of large-scale watershed protection; although some more significant localized benefits could be achieved if the preserve included important riparian areas. Therefore, the eight additional species that utilize surface water habitats could be expected to experience negligible to minor beneficial effects from implementation of this alternative, compared to the No Action alternative.

Similarly, the five additional species utilizing karst aquatic habitats would also be expected to experience negligible to minor beneficial effects from the proposed RHCP. These species are all associated with two locations in Hays County: San Marcos Springs (and associated spring runs) and Fern Bank Springs. Both of these locations have been designated as critical habitat for several of the listed species that occur there. The City of San Marcos and Texas State University currently manage the impacts from developed land uses and public access at San Marcos Springs, Spring Lake, and the upper reaches of the San Marcos River. Therefore, the proposed RHCP would have little effect on the physical condition of these riparian areas. It is uncertain whether Fern Bank Springs would be included within the preserve system. However, any lawful development in the immediate vicinity of Fern Bank Springs would have to comply with the ESA, and given the critical habitat designations at this site, it is likely that the Service would require substantial protections for the springs.

Even if the physical spring localities are protected, the aquatic habitats used by the five karst aquatic additional species depend on a narrow range of water quality and spring flow parameters. As described above, the limited scale of the preserve system compared to the total area contributing to the quality and availability of water in the Edwards and Trinity aquifers would limit the water quality protection benefits of the RHCP preserve system. The RHCP would have no influence on water quality protections outside of Hays County and would have

no effect on groundwater pumping within Hays County or elsewhere across the Edwards and Trinity aquifers. Therefore, because the proposed RHCP does not seek to cover listed aquatic species and, thus, does not specifically address issues related to water quality or quantity, the proposed RHCP may only have negligible to minor beneficial impacts on the five additional species utilizing karst aquatic habitats, compared to the No Action alternative.

#### 5.6.3.3 Additional Species Impacts – Alternative C (Moderate Preserve/Limited Take)

The Moderate Preserve/Limited Take alternative would have a negligible to minor beneficial effect on the 16 additional species, compared with the No Action alternative and with similar rationale as described for Alternative B. However, due to the more modest size of the anticipated preserve system under the Moderate Preserve/Limited Take alternative, the benefits to the additional species could be somewhat less than for the proposed RHCP.

#### 5.6.3.4 Additional Species Impacts – Alternative D (Large-scale Preserve)

Compared to the No Action alternative, the Large-scale Preserve alternative would likely result in minor to moderate beneficial effects with regard to the 16 additional species.

While the 30,000-acre preserve system specified by this alternative would be designed to include some of the best habitats in Hays County for the covered species, the scale of the conservation effort would improve the chances that the preserve system included populations of the additional terrestrial plants and important riparian corridors, springs, and recharge features utilized by the aquatic additional species. The Large-scale preserve system could also provide more substantial benefits for to water quality through the preservation of open space in a variety of Hays County watersheds.

## 5.7 Other Special Status Species

Nine other species with ranges including Hays County are listed as threatened or endangered under the ESA or by the State of Texas. These species are the American peregrine falcon, Arctic peregrine falcon, bald eagle, whooping crane, zone-tailed hawk, Cagle's map turtle, Texas horned lizard, San Marcos gambusia, and the red wolf. Impacts to these other state or federally listed species would be considered significant if they were to result in one or more of the following:

- The existing primary threats to these other species would decrease (a beneficial impact) or increase (an adverse impact) to a substantial degree.
- The long-term, local Hays County population trends of any of these other species would decrease (an adverse impact) or increase (a beneficial impact) substantially.

The intensity of potential impacts to the other special status species is defined as follows:

Negligible: The existing primary threats to the other special status species would

not be affected or the change would be so small as to not be of any measurable or perceptible consequence to the population. Negligible effects for Federally protected species would equate with a "may effect, not likely to adversely affect" determination by the U.S. Fish and Wildlife Service under the ESA.

Minor: There would be a measurable effect on the existing primary threats to the other special status species, but the change would be small and relatively localized and would not affect the long-term population trends in the County. For Federally protected species, minor effect would equate with a "may effect, not likely to adversely affect" determination by the U.S. Fish and Wildlife Service under the ESA.

Moderate: A noticeable effect to the existing primary threats to the other special status species would occur. The effect would be of consequence to the long-term population trends in the County. For Federally protected species, moderate effect would equate with a "'may effect" determination by the U.S. Fish and Wildlife Service and would be accompanied by a statement of either "likely to adversely affect" the species.

Major: Noticeable effect on the existing primary threats to the other special status species with severe consequences or exceptional benefits to the long-term population trends in the County. For Federally listed species, major effect would equate with a "may affect, likely to adversely affect" or a jeopardy determination by the U.S. Fish and Wildlife Service under the ESA.

### 5.7.1 Other Special Status Species Impacts – Alternative A (No Action)

Under the No Action alternative, the existing threats to the nine other state or federally protected species described in Section 4.6.3 would be likely to increase over the next 30 years. The habitats for these species include terrestrial environments and aquatic environments. Anticipated human population growth in Hays County and the associated increases in land development activities would be expected to replace and/or encroach on a broad range of natural habitat types, including those used by these special status species.

The effects of the anticipated land use changes in Hays County over the next 30 years could increase the threats to one or more of these species, resulting in negligible to moderate adverse impacts to any Hays County populations. However, the significance of these impacts is not likely to rise to the level where they would affect the range-wide populations of these species.

Five of the special status species (i.e., the American peregrine falcon, Arctic peregrine falcon, bald eagle, whooping crane, and zone-tailed hawk) are potential migrants through Hays

County and would be most likely to utilize riverine or riparian corridors in the county. While some portion of these habitat types in Hays County may be lost to or degraded by developed land uses, any decline is unlikely to be sufficient to affect the migratory patterns of these species or survival of these species during migration. Therefore, only negligible impacts would likely be expected.

Two of the nine special status species (i.e., the Cagle's map turtle and San Marcos gambusia) are aquatic and utilize surface streams in Hays County. Future land use changes are probably not likely to affect the San Marcos gambusia, because this species may already be extinct. Nevertheless, if the species is still extant, increasing land development in Hays County under the No Action alternative could adversely affect the gambusia as described for the RHCP additional aquatic species in Section 5.6.3.1. Threats to Cagle's map turtle include collections for the pet industry, intentional killings, pesticides, and loss of riverine and shoreline habitat due to impoundments and other man-made disturbances within riparian corridors. Increasing human populations and associated land development in Hays County under the No Action alternative could increase the level of threat to the turtle and result in minor to moderate adverse effects to the species.

The Texas horned lizard and the red wolf utilize upland habitats. Future land use changes under the No Action alternative are not likely to affect the red wolf, because this species has been extirpated from Texas. The Texas horned lizard is threatened by loss of rangeland habitat to land development and by predation from red imported fire ants. Increasing human populations and associated land development in Hays County under the No Action alternative could increase the level of threat to the lizard and result in minor to moderate adverse effects to the species.

### 5.7.2 Other Special Status Species Impacts – Alternative B (Proposed Hays County RHCP)

The potential impacts to the other special status species associated with increasing human population and associated land development would be similar to the No Action alternative. Therefore, any impacts to the other special status species related to the proposed RHCP would be associated with the potential benefits of the conservation measures included in this alternative, when compared to the No Action alternative. The potential beneficial effects of the creation of an approximately 10,000 to 15,000-acre preserve system (with a focus on protecting habitats for the covered species) on the other special status species would likely be overall beneficial, but negligible, since many of these species have rarely been observed in Hays County and/or may be extirpated or extinct. However, overall minor beneficial impacts to the Texas horned lizard and Cagle's map turtle could be possible if the RHCP preserve system included some open rangeland occupied by the lizard or riparian habitat along the Blanco River corridor used by the turtle.

### 5.7.3 Other Special Status Species Impacts – Alternative C (Moderate Preserve/Limited Take)

Under the Moderate Preserve/Limited Take alternative, the potentially adverse effects of increasing human population and land development in Hays County would be similar to the No Action alternative. As for the proposed RHCP, the effects of the Moderate Preserve/Limited Take alternative could yield some benefits to the other special status species that would be associated with the establishment of the 3,000-acre preserve system. However, due to the moderate size of the preserve system and the focus on protecting habitat for the covered species, it is likely that any such overall benefits to the other special status species would be negligible compared to the No Action alternative.

### 5.7.4 Other Special Status Species Impacts – Alternative D (Large-scale Preserve System)

The Large-scale Preserve system would create a 30,000-acre preserve system in Hays County that would be designed to protect high quality habitats for the covered species. However, the size of the preserve system could yield some benefits to the other special status species through the permanent protection of large blocks of woodland and shrubland habitats, some of which could occur along riparian corridors that could be used by one or more of the other special status species as breeding habitat (as for the Cagle's map turtle) or as migratory habitat (as for the five birds). Some open rangeland vegetation might also be included within the preserve system that could protect habitat for the Texas horned lizard. Therefore, the Large-scale Preserve System alternative could result in overall negligible to minor beneficial impacts on one or more of the other special status species, compared to the No Action alternative.

## 5.8 Socioeconomic Resources

Impacts to socioeconomic resources would be considered significant if they were to result in one or more of the following:

- Economic growth, including employment and per capita income, would substantially increase (a beneficial impact) or substantially decrease (an adverse impact).
- County finances, measured as accrual of annual tax base, would substantially increase (a beneficial impact) or substantially decrease (an adverse impact).
- Time and money expended on individual development projects by landowners for ESA compliance would substantially decrease (a beneficial impact) or substantially decrease (an adverse impact).
- The amount of time expended by the Service in ESA compliance for projects in Hays County would substantially decrease (a beneficial impact) or substantially increase (an adverse impact).

The intensity of potential impacts to socioeconomic resources is defined as follows:

Negligible: No change in economic or government agency activities would occur or the magnitude of the change would not be measurable.

Minor: Changes in economic or government agency activities would be measurable, but would not alter the structure, composition, or function of socioeconomic resources in Hays County and would be limited in context.

Moderate: Changes in economic or government agency activities would be measurable and may somewhat influence the structure, composition, or function of socioeconomic resources in Hays County, but would be limited in context.

Major: Changes in economic or government agency activities would be measurable, would alter the structure, composition, or function of socioeconomic resources in Hays County and may be extensive in context.

### 5.8.1 Population, Employment, and Economic Trends

#### 5.8.1.1 Impacts to Population, Employment, and Economic Trends – Alternative A (No Action)

Demographic and economic growth is projected to continue in the Austin area, including Hays County, for the foreseeable future. While population growth tends to follow the local economic cycle to some degree, the longer-term outlook is for the area to remain an attractive site for relocation. Other key factors that would help shape the course of the regional economy include the integration into a wider regional economy that includes the rapidly growing San Antonio area, expanding opportunities for higher education, and enhanced transportation infrastructure (both rail and highway).

<u>Population</u>

Population projections for Hays County were developed for the RHCP by TXP (an Austin-based economic analysis and public policy consulting firm) and Capital Market Research (CMR, an Austin-based market research firm specializing in real estate research, land development economics and market analysis) (TXP and CMR 2008). The projections were based on an analysis of historic and recent demographic and economic data (such as population, income, employment, and economic activity). The RHCP population estimate takes into account the most recently available population estimates for Hays County (July 2007), employment data (quarterly and annual information for 2007), migration rates, and information related to land development activity within Hays County.

Based on the TXP and CMR analysis, the population of Hays County is expected to increase from 97,589 in the year 2000 to an estimated 375,873 by the year 2040 (Table 5-1), which is a projected population increase of approximately 285 percent.

**Table 5-1. Projected Population Estimates for Hays County and Census Tracts by Decade (TXP and CMR 2008).**

| Census Tract | Census 2000 Population | Projected 2040 Population | Estimated Percent Change (2000 - 2040) |
|---|---|---|---|
| Hays County | 97,589 | 375,873 | 285% |
| CT 010100 | 1,908 | 3,799 | 99% |
| CT 010200 | 5,656 | 10,513 | 86% |
| CT 010301 | 10,176 | 22,600 | 122% |
| CT 010302 | 4,326 | 7,646 | 77% |
| CT 010400 | 4,343 | 18,691 | 330% |
| CT 010500 | 2,783 | 7,162 | 157% |
| CT 010600 | 7,904 | 18,689 | 136% |
| CT 010700 | 8,113 | 21,050 | 159% |
| CT 010801 | 12,908 | 66,295 | 414% |
| CT 010802 | 10,153 | 27,939 | 175% |
| CT 010901 | 6,609 | 15,872 | 140% |
| CT 010902 | 5,512 | 28,237 | 412% |
| CT 010903 | 8,643 | 52,076 | 503% |
| CT 010904 | 8,555 | 75,304 | 780% |

TXP and CMR used historic census tract population estimates and recent household and land development information to allocate the population forecast among the 14 census tracts delineated in the county.

Household and land development information used to help allocate the Hays County population forecast among census tracts included a review of building permit data and septic tank permit data provided by the cities of Buda, Kyle, and San Marcos; the Hays County Health Department; and the Capital Metropolitan Planning Organization. TXP and CMR also compiled a survey of currently approved residential subdivision lots that are available for future development (including a tally of the number of undeveloped residential lots in subdivisions approved for development or those with continued or pending sales efforts). The data provided a record of residential construction in Hays County by census tract since the year 2000.

Several census tracts in Hays County are projected to increase in population faster than the overall growth rate for the county, including the census tracts corresponding to the southern tip of Hays County (Census Tract 10400), the Dripping Springs area (Census Tract 10801), and

the Kyle-Buda area (Census Tracts 10902, 10903, and 10904). The most extreme population growth is expected in Census Tract 10904, which is associated with the city of Kyle (Table 4-2).

Projected population growth in census tracts with potential habitat for the golden-cheeked warbler and black-capped vireo (i.e., Census Tracts 10600, 10700, 10801, 10802, 10901, 10902, and 10904) is approximately 324 percent, which is a gain of approximately 193,632 people between 2000 and 2040.

Employment and Economic Trends

Over the next 30 years, county-based employment in Hays County is expected to increase as a reflection of population growth, although not at a steady rate. As in the past, employment levels are likely to fluctuate with periods of economic upturn and downturn. Long term projections are highly speculative and vary greatly. Employment forecasts adopted in 2005 by the Capital Area Metropolitan Planning Organization (CAMPO) suggest that employment in Hays County could increase from approximately 35,000 jobs in 2000 to approximately 126,000 jobs in 2030, which would represent an increase of approximately 260 percent or an average annual growth rate of approximately 4.4 percent (CAMPO 2005). At that rate of growth, the number of jobs in Hays County could reach approximately 184,000 by 2039 (the last year of the proposed permit term).

While per capita income has fluctuated in recent years, between 1996 and 2006 per capita income in Hays County increased by 49 percent or an average annual growth rate of approximately 4 percent. At that rate, the per capita income in Hays County could reach approximately $102,000 by 2039.

The current economic forecasts for Hays County and the region currently predict increases in employment and other economic indicators without the availability of a regional HCP alternative for ESA compliance. Therefore, the No Action alternative would be expected to have only negligible beneficial or adverse effects on employment and economic trends.

#### 5.8.1.2 Impacts to Population, Employment, and Economic Trends – Alternative B (Proposed Hays County RHCP)

Under the proposed RHCP, population and economic growth (including employment and per capita income) is expected to continue in Hays County in a pattern similar to that of the No Action alternative. Population growth trends would follow the local economic cycle, and the longer term outlook for the area is that it would remain an attractive site for relocation. For those businesses requiring incidental take permits for construction and/or operation of new facilities in Hays County, the availability of a regional HCP that would streamline ESA compliance could be a positive factor in site selection for individual projects (see Section 4.1). However, this potential beneficial effect cannot be quantified at this time. Over the 30 year duration of the RHCP, the potential benefits of a streamlined ESA compliance option on population, employment, and economic trends in Hays County are likely to be negligible

compared to the effects of other regional economic drivers described for the No Action alternative.

5.8.1.3 Impacts to Population, Employment, and Economic Trends – Alternative C (Moderate Preserve/Limited Take)

The effects of the Moderate Preserve/Limited Take alternative on Hays County population, employment, and economic trends would be similar to those described for the No Action alternative. The Moderate Preserve/Limited Take alternative would provide a regional HCP that might be seen as a potential benefit for those businesses requiring incidental take permits for construction and/or operation of new facilities in Hays County. However, the scope of this potential benefit would be limited by the relatively modest amount of incidental take authorized by this alternative. In either case, the potential beneficial effect on population and other economic indicators cannot be quantified at this time and is likely to be small compared to other regional economic and social factors driving socioeconomic trends in Hays County.

5.8.1.4 Impacts to Population, Employment, and Economic Trends s – Alternative D (Large-scale Preserve System)

Even with the very high incidental take authorization included in the Large-scale Preserve System alternative (the plan could cover requested take authorizations for all participants during the term of the permit for areas outside of the pre-determined preserve system), the overall Hays County population, employment, and economic trends would be similar to those described for the No Action alternative since alternative ESA compliance options already exist (see Section 4.1). This alternative would provide a regional HCP that might be seen as a potential benefit for those businesses requiring incidental take permits for construction and/or operation of new facilities in Hays County. However, the potential beneficial effect on population and other economic indicators cannot be quantified at this time and is likely to be small compared to other regional economic and social factors driving socioeconomic trends in Hays County. Therefore, the overall impact on population and other local and regional economic indicators is likely to be negligible, compared to the No Action alternative.

### 5.8.2 Land Use and Housing Trends

5.8.2.1 Impacts to Land Use and Housing Trends – Alternative A (No Action)

Current land use trends, which would be expected to continue under the No Action alternative, are described in Section 4.7.3. These trends suggest a continued loss of forested land as it is converted to other uses, including urban development.

Under the No Action alternative, there would be an increase in the number of large master-planned communities and commercial developments expected over the next 30 years in response to the rapidly increasing human population. Assuming that the average household size remains constant, anticipated population increases could lead to the addition of approximately

68,000 new households to the portion of Hays County west of Interstate Highway 35 (i.e., the area of the county containing potential habitat for the covered species) over the next 30 years. The average value of a single family residence is expected to continue to rise in conjunction with overall Austin-Round Rock MSA economic activity and could double in value from approximately $135,700 in 2007 to approximately $271,400 in 2039.

The current projections for land use and housing trends in Hays County currently predict increases in urban development and housing prices without the availability of a regional HCP alternative for ESA compliance. Therefore, the No Action alternative would be expected to have only negligible impacts on land use and housing trends.

#### 5.8.2.2 Impacts to Land Use and Housing Trends – Alternative B (Proposed Hays County RHCP)

Under the proposed RHCP, land use and housing trends would be expected to continue as described for the No Action alternative. However, the completion of participating housing or land development projects could occur faster under the proposed RHCP than would be possible under the No Action alternative. Streamlined ESA compliance could reduce the amount of permitting time needed to comply with the ESA from one or two years to a few weeks. Although, ESA permitting is only one part of the development process and it is uncertain how much of an impact streamlined compliance could have on the overall schedule of an individual project. Substantially reducing the time associated with ESA compliance for individual participating projects would not likely have a significant impact on permitting requirements through other agencies or jurisdictions. Further, potential time savings for completion of individual projects due to streamlined ESA compliance (even if individual participating projects were to be completed a year or two faster than would otherwise be possible with an individual authorization from the Service) would not be likely to substantially influence overall trends in housing or land development during the 30-year term of the permit.

Therefore, the proposed RHCP would likely have only minor beneficial impacts on housing and construction trends, compared to the No Action alternative. Potential impacts to housing prices in Hays County would likely be negligible under the proposed RHCP, compared to the No Action alternative, since the average value of a single-family residence in Hays County is expected to continue to rise in conjunction with overall Austin-Round Rock MSA economic activity.

#### 5.8.2.3 Impacts to Land Use and Housing Trends – Alternative C (Moderate Preserve/Limited Take)

Land use and housing trends under the Moderate Preserve/Limited Take alternative would be expected to continue as described for the No Action alternative. For the limited number of development projects that would participate in this regional HCP, completion of these projects could occur faster than would be possible under the No Action alternative. Although, as described above, reducing the time associated with ESA compliance for the limited

number of participating projects would not likely have a significant impact on permitting requirements through other agencies or jurisdictions. Further, the relatively small number of participating projects would also moderate the potential beneficial impacts to the land development community. Therefore, this alternative would likely have only minor beneficial impacts on housing and construction trends, compared to the No Action alternative. Potential impacts to housing prices in Hays County would likely be negligible under the Moderate Preserve/Limited Take alternative, compared to the No Action alternative, since the average value of a single-family residence in Hays County is expected to continue to rise in conjunction with overall Austin-Round Rock MSA economic activity.

#### 5.8.2.4 Impacts to Land Use and Housing Trends – Alternative D (Large-scale Preserve System)

Land use and housing trends under the Large-scale Preserve alternative would largely be expected to continue as described for the No Action alternative. For projects seeking incidental take authorization through this regional HCP, completion could occur faster than would be possible under the No Action alternative. However, substantially reducing the time associated with ESA compliance for the limited number of participating projects would not likely have a significant impact on permitting requirements through other agencies or jurisdictions. Therefore, this alternative would likely have only minor beneficial impacts on housing and construction trends, compared to the No Action alternative. Potential impacts to housing prices in Hays County would likely be negligible under the Large-scale Preserve alternative, compared to the No Action alternative, since the average value of a single-family residence in Hays County is expected to continue to rise in conjunction with overall Austin-Round Rock MSA economic activity.

### 5.8.3 Hays County Finances

#### 5.8.3.1 Impacts to Hays County Finances – Alternative A (No Action)

County finances are primarily influenced by the assessed value of taxable property in the county (i.e., the County's tax base). The County's tax base in 2008 (i.e., the total appraised value of property and improvements in the county) was approximately $10.1 billion. Under the No Action alternative, if the tax base growth continues in a pattern similar to the past (including appreciation in the 2008 tax base and new value from residential and commercial development), the tax base for the county could reach approximately $55.5 billion by 2039 (see Appendix F of the Hays County RHCP).

Under the No Action alternative, the County would disburse funds from the recently passed 2008 Road Bond initiative to construct, improve, and expand various County roads. County road improvement efforts could result in take of the covered species and, thus, the need for individual incidental take permits or Section 7 ESA consultations for some of the proposed projects identified in the 2008 Road Bond, including improvements to Farm-to-Market Road

2325 near Wimberley, Ranch Road 1626 near Buda, and Ranch Road 12 between Wimberley and San Marcos. Therefore, Hays County would likely need to expend funds for ESA compliance for the golden-cheeked warbler and black-capped vireo related to the completion of these (and potentially other) road improvement projects. While Hays County could use the remaining 2006 Parks and Open Space bonds to acquire property with habitat for the golden-cheeked warbler and black-capped vireo, it is likely that the 2006 Parks and Open Space bond funds would be expended prior to initiation of the road improvement projects and would, therefore, be unavailable to mitigate for endangered species impacts from these projects. Under the No Action alternative, the County would need to find additional funding for ESA compliance on a case-by-case basis. The need to find additional funding for ESA compliance to support County-sponsored projects would likely create a minor adverse impact on Hays County finances under the No Action alternative.

#### 5.8.3.2 Impacts to Hays County Finances – Alternative B (Proposed Hays County RHCP)

Implementation of the proposed RHCP would include the acquisition of preserve land, ongoing management and monitoring of the preserve system, administration of the participation process, and implementation of research and outreach programs. Funding to implement the proposed RHCP would come from at least two sources: participation fees based on impacts to potential habitat for the covered species and the County's general operations and maintenance fund. In addition, the funding plan for the proposed RHCP assumes that the County will dedicate approximately $5 million from the 2006 Parks and Open Space bond funds to acquire several hundred acres of preserve land with potential habitat for the covered species prior to the start of the RHCP.

The funding plan presented in Section 8 of the proposed RHCP shows that the costs to implement the RHCP in Year 1 of the Plan could be approximately $2,515,262. These implementation costs could rise to approximately $4,124,675 by Year 10, approximately $6,920,738 by Year 20, and approximately $10,380,202 by Year 30. The total estimated cost to implement the RHCP, as illustrated by the RHCP funding plan, could be approximately $182.6 million over 30 years.

The cost of RHCP implementation would be offset by the collection of participation fees from other public or private RHCP participants on the basis of impacts to potential habitat for the covered species. The County would also contribute approximately $5 million from the 2006 Parks and Open Space bond to acquiring RHCP preserve land. Based on the land development and participation projections presented in the RHCP, participation fees could generate approximately $98.4 million in revenue to support the RHCP. These participation fees could represent approximately 54 percent of the revenue needed to implement the RHCP. The remaining RHCP operating budget is expected to come from the County's general fund (i.e., approximately $79.2 million over 30 years).

Under the proposed RHCP, Hays County finances and services would be affected in several ways.

Existing Bond Funds

To initiate the rolling conservation bank, the County would use approximately $5 million from the remaining 2006 Parks and Open Space bond funds to purchase several hundred acres of preserve land with high quality habitat for the golden-cheeked warbler and black-capped vireo prior to RHCP approval and issuance of the incidental take permit. This preserve land would be protected and managed in accordance with the provisions of the RHCP. While this preserve land would contribute to the acquisition of general open space and habitat for endangered species, using the 2006 Parks and Open Space bond funds may or may not contribute substantially to the other identified objectives for the use of these funds, including protecting recharge land for the aquifers and providing public access to major waterways. Therefore, the use of these funds for acquiring land for the RHCP could preclude the acquisition of other types of parks and public recreation facilities in Hays County; although there may be opportunities to satisfy multiple open space objectives.

However, use of a portion of the 2006 Parks and Open Space bond funds to initiate the RHCP conservation bank could prevent the County from needing to use the 2008 road bond funds for ESA compliance associated with individual projects. It is also likely that completion of any ESA authorizations for road projects funded by the 2008 bond package through the proposed RHCP would be more cost effective (in terms of time and money) than for the No Action alternative.

The proposed RHCP would likely have a negligible to minor beneficial effect on the use of voter-approved bond funds compared to the No Action alternative, since use of the 2006 Parks and Open Space bonds for the RHCP preserve system is compatible with the objectives for this program and the ESA compliance costs associated with road projects funded by the 2008 road improvement bonds are likely to be reduced.

General Maintenance and Operations Funds

Implementation of the proposed RHCP would require the County to commit to the long-term funding of the Plan. The ESA requires that an applicant for an incidental take permit ensure that adequate funding would be available to implement the HCP. To meet this requirement, Hays County has approved the RHCP funding plan as described in Section 8 of the RHCP. Included in the funding plan is the commitment that every year during the 30-year term of the permit the County would evaluate the financial plan to ensure adequate funding to meet the goals and objectives of the RHCP. While the County may opt out of the RHCP at some point in the future, any mitigation requirements for take that has already occurred must be continued in perpetuity.

The funding plan described in the proposed RHCP would provide for the implementation of the conservation program, including the acquisition, management, and monitoring of preserves, and the implementation of other research and public outreach programs described in the conservation program. So long as the County is otherwise meeting its financial obligations under the Plan, the disposition of its financial resources remains within the sole and exclusive purview of the Commissioners' Court.

The funding plan for the proposed RHCP would annually divert up to approximately 10 percent of the property tax revenues generated by new development in Hays County after permit issuance to the RHCP for land acquisition, preserve management and monitoring, and program administration. Alternatively, this contribution would represent approximately 3 percent of the cumulative general fund revenues collected between 2010 and 2039. Since no new taxes are proposed, the diversion of these funds to the RHCP could happen at the expense of other County services and programs.

While implementation of the RHCP could divert approximately $79.2 million in general fund revenue over the 30-year life of the Plan, the impact of this diversion would be moderated by potential gains to the County tax base associated with potentially accelerated additions to the tax base from participating projects reaching completion sooner than would be possible with individual ESA authorizations and the potential for higher real estate values for properties adjacent to RHCP preserves. Therefore, the use of general operations and maintenance funds for the RHCP could have an overall minor adverse impact on County finances.

Tax Base

The time savings for permitting incidental take of the covered species through the proposed RHCP would likely result in the participating projects entering the County's tax base at residential and commercial land tax rates one to two years sooner than under the No Action alternative. The accelerated addition of value to the tax base would likely result in a minor beneficial impact on County finances; however the exact amount of this benefit is impossible to calculate due to the long-term uncertainties in the local economy.

In addition, the creation of large tracts of preserve land under the proposed RHCP would likely increase the value of adjacent property (i.e., the "proximate principle"), which would further benefit the County. It has been demonstrated in other locations that proximity to greenbelts, parks, and preserves commonly has a positive effect on the values of adjacent residential property. In one study, it was found that properties adjacent to a greenbelt were appraised at over 30 percent higher than properties that were 3,200 feet or more away from the greenbelt (Correll et al. 1978). In Dallas, homes facing parkland were found to be worth 22 percent more than homes that were more than one-half mile from such an amenity (Miller 2001). In Austin, property adjoining the Barton Creek Greenbelt was eight to 12 percent higher in value than comparable property not adjacent to the greenbelt (Nicholls 2002).

Since implementation of the RHCP is expected to increase ESA compliance and result in more conservation for the covered species than would be expected under the No Action alternative (i.e., the permanent protection of more preserve land), potential benefits to the County's tax base due to the proximate principle would likely be greater under this alternative than under the No Action alternative. Therefore, the proposed RHCP could have a minor positive impact on the County's tax base.

5.8.3.3 Impacts to Hays County Finances – Alternative C (Moderate Preserve/Limited Take)

Implementation of the Moderate Preserve/Limited Take alternative would include the acquisition of preserve land (i.e., 3,000 acres within the first four years of the plan), ongoing management and monitoring of the preserve system, administration of the participation process, and implementation of research and outreach programs. It is likely that funding to implement the regional HCP under this alternative would come from at least three sources: bonds or other debt financing to fund the upfront preserve acquisitions, participation fees based on impacts to potential habitat for the covered species, and the County's general operations and maintenance fund.

Land acquisitions for the preserve system could cost approximately $24 million within the first four years of the plan, given the same assumptions regarding per acre land costs and mix of fee simple and conservation easement acquisitions used for the proposed RHCP alternative. To achieve these early land acquisitions, which would be necessary under state law, the County would need to issue bonds or use other types of debt financing. Repaying the principal and interest on this debt would add additional cost to the budget for this plan. Assuming a repayment term of 20 years and an annual interest rate of 5.5 percent, the total cost to repay approximately $24 million in debt could be approximately $40 million.

After the initial four years of the plan, most of the costs associated with plan implementation would be associated with the ongoing management and monitoring of the preserve system and other administrative tasks associated with managing participation and implementation of associated research and public outreach programs (similar to that described for the proposed RHCP). Since the total size of the preserve system and the amount of participation in the plan is expected to be much smaller under the Moderate Preserve/Limited Take alternative than the proposed RHCP, the costs associated with these tasks would also be less. While a detailed budget for implementation of the Moderate Preserve/Limited Take alternative has not been completed, it is anticipated that the ongoing preserve management and monitoring costs and other administrative costs would be approximately one-quarter of those estimated for the proposed RHCP, based on the relative sizes of the preserve systems for these alternatives. Therefore, the County could expect to spend approximately $38 million over the next 30 years on plan costs not associated with land acquisitions.

The cost of plan implementation (which could total approximately $78 million over 30 years) would be partially offset by the collection of participation fees from other public or

private RHCP participants on the basis of impacts to potential habitat for the covered species. However, due to the limited amount of take authorization under this alternative, the amount of revenue generated from the sale of mitigation credits (estimated at approximately 3,600 credits) would also be limited. Based on the annual projections of mitigation credit need presented in Appendix E of the RHCP, participation fees under the Moderate Preserve/Limited Take alternative could generate approximately $38 million in revenue to support the RHCP.

Because participation fees could not fully fund ongoing preserve management and monitoring and other plan administration over the 30 years of the program (i.e., participation fee revenue would only be available for the first 10 to 15 years of the plan, at which point no more credits would be available for sale), the County would need to use revenue from its general operations and maintenance fund to repay the land acquisition debt and cover any cost contingencies.

Under this alternative, Hays County finances and services could be affected in several ways.

Existing Bond Funds

The Moderate Preserve/Limited Take alternative does not require an advance acquisition of preserve land to jump-start a conservation bank, since this alternative includes a defined commitment of preserve lands within a short period of time. Therefore, this alternative would have negligible impacts on the use of the remaining 2006 Parks and Open Space bond funds, unless the Count opted to use these funds for the plan.

As for the proposed RHCP, the effect of the Moderate Preserve/Limited Take alternative on the use of the 2008 road improvement bonds would likely be beneficial, since the costs of ESA compliance associated with projects funded by these bonds would be reduced with the availability of a regional HCP.

General Operations and Maintenance Funds

As for the proposed RHCP, implementation of the Moderate Preserve/Limited Take alternative would require the County to commit to the long-term funding of the conservation program. Under this alternative, the County would use general fund revenues primarily to repay the debt associated with the preserve acquisitions in the first four years of the RHCP. Assuming a repayment term of 20 years and an interest rate of 5.5 percent, the amount needed to meet this obligation could be more than $40 million over 30 years. This amount would represent approximately 1.5 percent of the cumulative general fund revenues estimated under the No Action alternative between 2010 and 2039. The County would also need to use general fund revenue if participation fees did not generate sufficient funds in any given year to meet annual management, monitoring, and administrative needs. Since no new taxes are proposed, the diversion of these funds to the plan could happen at the expense of other County services and programs.

Compared to the No Action alternative, the implementation of the Moderate Preserve/Limited Take alternative would likely have a minor adverse impact on County finances since the County would need to use a portion of its general funds to repay the debt needed to purchase the preserve system and no new taxes are proposed.

Tax Base

Potential impacts of the Moderate Preserve/Limited Take alternative on the County's tax base would be similar to those described for the proposed RHCP (i.e., a minor beneficial impact compared to the No Action alternative). However, any benefits would likely be less significant for this alternative than for the proposed RHCP since the overall size of the preserve system would be less and would lead to fewer opportunities for adjacent properties to experience value increases due to the proximate principle.

5.8.3.4 Impacts to Hays County Finances – Alternative D (Large-scale Preserve System)

Implementation of the Large-scale Preserve System alternative would include the acquisition of preserve land (i.e., 30,000 acres within the first four years of the plan), ongoing management and monitoring of the preserve system, administration of the participation process, and implementation of research and outreach programs. Funding to implement this alternative would come from at least three sources: bonds or other debt financing to fund the upfront preserve acquisitions, participation fees based on impacts to potential habitat for the covered species, and the County's general maintenance and operations fund.

Land acquisition for the preserve system could cost approximately $243 million within the first four years of the plan, given the same assumptions regarding per acre land costs and mix of fee simple and conservation easement acquisitions used for the proposed RHCP. To achieve these early land acquisitions, which would be necessary under state law, the County would need to issue bonds or use other types of debt financing. Repaying the principal and interest on this debt would add additional cost to the budget for this plan. Assuming a repayment term of 20 years and an annual interest rate of 5.5 percent, the total cost to repay approximately $243 million in debt could be approximately $408 million.

After the initial four years of the plan, most of the costs associated with plan implementation would be associated with the ongoing management and monitoring of the preserve system and other administrative tasks associated with managing participation and implementation of associated research and public outreach programs (similar to that described for the proposed RHCP). Since the total size of the preserve system is expected to be much larger under the Large-scale Preserve System alternative than the proposed RHCP, the costs associated with these tasks would also be more. While a detailed budget for implementation of the Large-scale Preserve System alternative has not been completed, it is anticipated that the ongoing preserve management and monitoring costs and other administrative costs would be approximately 2.6 times larger than those estimated for this alternative, based on the relative

sizes of the preserve systems for these alternatives. Therefore, the County could expect to spend approximately $98 million over the next 30 years on plan costs not associated with land acquisitions.

The cost of plan implementation (which could total approximately $506 million over 30 years) would be partially offset by the collection of participation fees from other public or private RHCP participants on the basis of impacts to potential habitat for the covered species. However, due to the amount of participation anticipated under this alternative, the amount of revenue generated from the sale of mitigation credits could be limited. Assuming that participation in the Large-scale Preserve System alternative is similar to participation rates estimated for the proposed RHCP, approximately 10,300 mitigation credits would be sold to participants. Accordingly, the amount of revenue generated from participation fees under the Large-scale Preserve System alternative would be similar to the revenue generated by participation fees under the proposed RHCP (i.e., approximately $98.4 million over 30 years).

Since participation fees would only partially fund the costs of implementing the Large-scale Preserve System alternative (i.e., participation fees would cover approximately 19 percent of the total costs), the County would need to use revenue from its general operations and maintenance fund to repay the land acquisition debt and cover any cost contingencies.

Under the Large-scale Preserve System alternative, Hays County finances and services would be affected in several ways.

Existing Bond Funds

The Large-scale Preserve System alternative does not require an advance acquisition of preserve land to jump-start a conservation bank, since this alternative includes a defined commitment of previously identified preserve lands within a short period of time (i.e., as specified by Chapter 83 of the Texas Parks and Wildlife Code, four years after the issuance of the federal permit or six years after the initial application for the permit, whichever is later). Therefore, this alternative would have negligible impacts on the use of the remaining 2006 Parks and Open Space bond funds, unless the County opted to use these funds for the plan.

As for the proposed RHCP, the effect of the Large-scale Preserve System alternative on the use of the 2008 road improvement bonds would likely be beneficial, since the costs of ESA compliance associated with projects funded by these bonds would be reduced with the availability of a regional HCP.

General Operations and Maintenance Funds

As for the proposed RHCP, implementation of the Large-scale Preserve System alternative would require the County to commit to the long-term funding of the conservation program. Under this alternative, the County would use general fund revenues to repay the debt associated with the preserve acquisitions in the first four years of the RHCP and to cover any

other implementation costs not covered by participation fee revenue. The amount needed to meet this obligation could be more than $401 million over 30 years. This amount would represent approximately 15 percent of the anticipated cumulative value of the general fund under the No Action alternative between 2010 and 2039. Since no new taxes are proposed, the diversion of these funds to the plan would happen at the expense of other County services and programs.

Compared to the No Action alternative, the implementation of the Large-scale Preserve System alternative would likely have a moderate adverse impact on County finances since the County would need to use a relatively large portion of its general funds to fund the implementation of the plan.

Tax Base

Potential impacts of the Large-scale Preserve System alternative on the County's tax base would be similar to those described for the proposed RHCP (i.e., a minor beneficial impact compared to the No Action alternative). However, any benefits would likely be somewhat more significant for this alternative than for the proposed RHCP since the overall size of the preserve system would be greater and would lead to more opportunities for adjacent properties to experience value increases due to the proximate principle.

### 5.8.4 Endangered Species Act Compliance Burden

#### 5.8.4.1 ESA Compliance Burden Impacts – Alternative A (No Action)

Under the No Action alternative, the number of ESA authorizations between landowners and the Service is expected to increase in conjunction with anticipated increases in human population and land development. Despite the low ESA compliance record in Hays County to date, the Service expects to conduct more compliance actions in the future due to increasing awareness of endangered species issues across central Texas.

It is not uncommon for individual ESA authorizations to require two years or more to complete. As reported in the Williamson County Regional Habitat Conservation Plan Final Environmental Impact Statement, the Service anticipates expending an estimated 0.25 to 0.5 of a full-time employee equivalent (FTE) for each ESA consultation per year. For an estimated 90 individual authorizations (i.e., three Section 10 permits or Section 7consultations per year for 30 years), the Service would expend the equivalent of one to two full-time staff positions for the next 30 years engaged only in negotiating and processing ESA authorizations for projects in Hays County. Project uncertainty and potential project delays would continue to occur for those projects requiring actions on behalf of the Service related to the ESA.

ESA compliance costs for project proponents in Hays County (including project delays, consultation fees, and mitigation costs) cannot be calculated due to a lack of information on the specifics of each future project, including location, species affected, amount of habitat affected,

future interest rates, debt service needs, and lack of information on the specifics of each project affected. However, the cumulative costs to landowners and project proponents related to ESA compliance under the No Action alternative could be substantial, resulting in an overall moderate adverse impact.

#### 5.8.4.2 ESA Compliance Burden Impacts – Alternative B (Proposed Hays County RHCP)

Compared to the No Action alternative, the proposed RHCP would have a beneficial impact on a landowner's or project proponent's ESA compliance burden and the Service's ESA consultation burden. The proposed RHCP could reduce the amount of time needed to obtain incidental take authorization for the covered species by up to two years.

Following historical patterns of individual consultations between project proponents and the Service, it is expected that up to 20 percent of the 90 anticipated individual ESA consultations over the next 30 years would be avoided by participation in the proposed RHCP. Participation in the RHCP would reduce the amount of staff time the Service would need to dedicate to ESA consultations in Hays County, which would be a moderate beneficial impact for the Service.

For project proponents, participation in the proposed RHCP would also reduce the uncertainty regarding permit processing times and mitigation obligations. The cost savings to project proponents in Hays County can not be precisely determined due to a lack of information regarding project specifics such as project location, species affected, habitat impacted, future interest rates, debt service needs, and similar information. However, substantial time and cost savings would be expected for participants in the proposed RHCP and would likely represent a moderate beneficial impact.

#### 5.8.4.3 ESA Compliance Burden Impacts – Alternative C (Moderate Preserve/Limited Take)

As for the proposed RHCP, the Moderate Preserve/Limited Take alternative would reduce the amount of time project proponents and the Service would need to spend applying for and processing individual ESA authorizations. The amount of time saved could be up to two years for regional HCP participants and would be a beneficial effect for project proponents and the Service, compared to the No Action alternative.

However, fewer projects would be able to participate in the regional HPC, due to the relatively small amount of take authorization allowed under this alternative. Therefore, the potential cumulative benefits to project proponents and the Service over the 30-year term of the permit would be less than for the proposed RHCP. The Moderate Preserve/Limited Take alternative would only be expected to have a minor beneficial effect on easing the ESA compliance burden in Hays County.

5.8.4.4 ESA Compliance Burden Impacts – Alternative D (Large-scale Preserve System)

The effects of the Large-scale Preserve System alternative on project proponents' and the Service's ESA compliance burden would be similar to that described for the proposed RHCP (Alternative B), since the plan would be designed to cover all of the anticipated need for participation. Therefore, the Large-scale Preserve System alternative would result in a moderately beneficial impact for the Service and individual project proponents in Hays County.

## 5.9 Cumulative Impacts

A cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively noteworthy actions taking place over a period of time. "Reasonably foreseeable future actions" are defined as actions that are not speculative. They have been approved, are included in short- to medium-term planning and budget documents prepared by government agencies or other entities, or are based on likely trends. Cumulative impacts can result from individually minor, but collectively noteworthy actions taking place over a period of time.

### 5.9.1 Water Resources, Vegetation, and General Wildlife

5.9.1.1 Water Resources

Chapter 307.1 of the Texas Administrative Code addresses surface water quality standards for the State. This chapter states that it is the policy of the State "to maintain the quality of water in the state consistent with public health and enjoyment, propagation and protection of terrestrial and aquatic life, operation of existing industries, and economic development of the state."

The TCEQ (formerly known as the Texas Natural Resource Conservation Commission) regularly monitors and assesses the extent to which the State's waters provide for healthy aquatic communities, water-based recreation, and safe public water supplies as part of its Texas Water Quality Inventory. The State's surface water quality standards define the goals for a body of water with respect to five general use categories for which the water body should be suitable. The five use categories are: Aquatic Life (standards that are designed to protect plant and animal species that live in and around water), Contact Recreation ( standards designed to ensure that water is safe for swimming or other water sports that involve direct contact with water), Public Water Supply (standards that indicate whether water from a lake or river is suitable for use as a source for a public water supply system), Fish Consumption (standards designed to protect people from eating fish or shellfish that may be contaminated), and General Uses (standards pertaining to other basic uses such as navigation, agricultural water supply, industrial water supply, and aesthetic considerations).

For stream segments crossing Hays County that were addressed in the 2000 Texas Water Quality Inventory, one or more of the uses of surface water resources were not fully supported for six of the County's ten monitored stream segments. Water quality concerns for these impaired streams included depressed dissolved oxygen levels, elevated fecal coliform densities, elevated average sulfate levels, elevated concentrations of dissolved solids, and/or elevated nitrate levels (Texas Natural Resource Conservation Commission 2002).

The 2008 Texas Water Quality Inventory identifies only one impaired stream segment crossing Hays County that did not fully support one or more of the general use categories (although three streams were identified as "of concern" for approaching non-attainment in some criteria or for approaching additional screening levels for these criteria) (TCEQ 2008a).

TCEQ administers a number of water quality monitoring and assessment, permitting, and planning programs in coordination with other agencies, organizations, and local stakeholder groups to protect and improve the quality of the State's waters. The TCEQ reports that its pace and progress in addressing water quality impairments documented on the State's 303(d) list has risen sharply since 2000 (TCEQ 2006).

With respect to groundwater resources, Section 26.401 of the Texas Water Code establishes the State's groundwater protection policy which sets a goal of non-degradation of groundwater resources for all State groundwater quality programs. This policy provides that groundwater quality should be restored if feasible. Overall, the approach strives to protect groundwater resources for their highest quality use related to human health and the environment. Several State agencies are responsible for regulating groundwater, including the TCEQ and the Texas Water Development Board, among others. The Texas Groundwater Protection Committee was established by the State legislature in 1989 to bridge the gap between existing State groundwater programs and optimize water quality protection by increasing cooperation among these different State agencies (TCEQ 2008b).

The Texas Groundwater Protection Committee actively identifies opportunities to improve existing groundwater quality protection programs and strives to improve or identify areas where new or existing programs could be enhanced to provide additional protection (TCEQ 2008b). At the local level, four Groundwater Conservation Districts, which are local units of government charged with the management and protection of groundwater resources, cover portions of Hays County (i.e., Hays Trinity Groundwater Conservation District, Edwards Aquifer Authority, Barton Springs Edwards Aquifer Conservation District, and Plum Creek Conservation District). Groundwater Conservation Districts are required to develop groundwater management plans.

Cumulative impacts on water resources within the area of potential effect would result from the rapidly increasing human population, increased development, and changes in land use.

New development will likely encroach onto aquifer recharge zones and could increase the potential for contamination of water quality or recharge damage. In addition, development

activities in other Texas counties could also impact water resources within Hays County. For the No Action alternative, the continuation of land development trends has the potential of reducing or degrading available water supplies in Hays County and contributing to adverse cumulative impacts on the available water supply for humans, wildlife, and vegetation.

The implementation of a regional HCP would have the potential to create an overall cumulative, beneficial effect on water quality and quantity in Hays County and elsewhere across the region. The implementation of a regional HCP would be expected to increase compliance with the ESA and result in more conservation actions for the covered species, primarily via the protection of large blocks of native vegetation communities. In addition, these conservation actions would be more systematic than would individual, project-specific mitigation efforts for the covered species under the No Action alternative. The scale of these beneficial cumulative impacts would vary between negligible (for the Moderate Preserve/Limited Take alternative) to minor (as for the proposed RHCP or the Large-scale Preserve System alternative).

#### 5.9.1.2 Vegetation

The impacts of prior land use activities in Hays County on vegetation communities are described in Table 4-2 (see Section 4.4). Between 1992 and 2001, the U.S. Geological Survey estimates that approximately 31,111 acres of forest cover were lost during that period. Much of this forest cover was converted to grassland or shrub vegetation (approximately 24,488 acres of these vegetation communities were created between 1992 and 2001). However, approximately 4,423 acres of new urban cover was also created during this time period, which represents a loss of undeveloped vegetation communities.

As described in Section 5.3 of the RHCP, approximately 24,500 acres of land development association with ongoing residential construction in currently platted subdivisions, new projects that are currently undergoing the subdivision approval process, and a number of road improvement projects are reasonably certain to occur in the coming years. This development would be expected to increase the amount of urban land cover in the county and decrease the amount of undeveloped vegetation communities (particularly forest cover and grassland or shrub cover). However, a detailed projection of any such land cover changes is not possible.

As for water resources, cumulative impacts to vegetation communities within the area of potential effect would result from the rapidly increasing human population, increased development, and changes in land use. The current composition, distribution, and extent of the various vegetation communities in Hays County are the result of past and present land development patterns, recreational and agricultural land uses, water availability, and climatic events (such as droughts and floods). As described in previous sections, all four alternatives evaluated in this EIS would result in moderate adverse impacts on vegetation (compared to current conditions) as land development trends would continue as described for the No Action alternative. However, compared to the No Action alternative, each of the action alternatives

would have a somewhat positive impact on regional vegetation patterns as large blocks of mitigation lands within Hays County would be acquired and managed in perpetuity as habitat for the endangered golden-cheeked warbler and black-capped black-capped vireo. Thus, the incremental impacts of each of these action alternatives would slightly offset the adverse cumulative impacts on vegetation from other regional impacts.

#### 5.9.1.3 General Wildlife

Directly related to vegetation and water resources, wildlife populations in Hays County are also anticipated to be moderately adversely impacted as a result of the prior loss of undeveloped vegetation communities between 1992 and 2001 (see Section 5.9.1.3), the anticipated conversion of additional undeveloped vegetation to urban land cover associated with approximately 24,500 acres of ongoing or currently planned/approved development projects in Hays County, and the potential 48,095 acres of projected future land development within Hays County.

The 2005 Texas Wildlife Action Plan (formerly known as the Texas Comprehensive Wildlife Conservation Strategy) developed by TPWD identifies threats to the State's wildlife resources associated with changing demands on land resources (such as land development and fragmentation that threaten the viability of natural habitats and the sustainability of wildlife populations), introduced species (non-native plants and animals that displace native species and threaten habitat integrity for native wildlife), noxious brush and invasive plants (excessive quantities of even native plants can reduce the quality of wildlife habitat), overgrazing and fire suppression (improper application of these management tools or uses have contributed to a drastic alteration of the historic landscape), and limited understanding of complex natural systems (lack of reliable knowledge about the function of natural systems can lead to inappropriate conservation or management decisions) (TPWD 2005).

The 2005 Texas Wildlife Action Plan considers the ecoregions occurring in Hays County to be relatively high priorities for management and conservation efforts. The Blackland Prairie ecoregion is considered a high priority due largely to the drastic reduction of native prairie since European settlement and associated declines in prairie species. The Edwards Plateau ecoregion is considered a secondary priority highlighted by the high degree of biodiversity and endemism that occurs in this region (TPWD 2005). TPWD has identified 192 native wildlife species of conservation concern that occur in the Blackland Prairie ecoregion and 301 native wildlife species of conservation concern that occur in the Edwards Plateau ecoregion. These lists identify species with low or declining populations that are important to the health and diversity of the State's wildlife resources.

Cumulative impacts to wildlife depend on whether a particular wildlife species thrives or deteriorates as a result of human encroachment. Urban-adapted or tolerant wildlife species (such as raccoons, squirrels, grackles, and blue jays) could benefit from an increase in human

activity, while other species (such as cave-dependent bats, bobcats, forest dwelling birds, and many reptiles) would decrease as humans convert or encroach upon natural landscapes.

As discussed above for vegetation, the action alternatives would have a slight benefit to general wildlife populations compared to the cumulative impacts of the No Action alternative as large tracts of mitigation lands would be acquired and managed in perpetuity. These large tracts of land would provide wildlife populations with the necessities required for species survival. Thus, the incremental impacts of each of these alternatives would slightly offset adverse cumulative impacts on general wildlife populations from other regional impacts.

### 5.9.2 Hays County Special Status Species

#### 5.9.2.1 Covered Species (Golden-cheeked Warbler and Black-capped Vireo)

Historic estimates of potential golden-cheeked warbler habitat in Hays County vary from approximately 75,000 acres in 1962 (Pulich 1976) to approximately 50,644 acres in 1988 (USFWS 1992). More recent estimates suggest that as much as 170,355 acres of potential habitat may be currently present in Hays County (Loomis 2008); however, only approximately 148,638 acres (87 percent) of this potential habitat has a probability of being occupied by the species (Loomis 2008). Unfortunately, direct comparison of the various historic and recent habitat estimates is complicated by different methodologies used to identify potential habitat, and it is not possible to derive reliable trends regarding past habitat conditions from these data.

There have been no historic estimates of potential black-capped vireo habitat in Hays County, but Wilkins et al. (2006) reported a recent county-wide estimate of approximately 23,855 acres of potential black-capped vireo habitat in Hays County.

While historic trends in habitat conditions for the covered species are unavailable, it is almost certain that some amount of habitat loss and/or degradation occurred in association with increasing populations and urban and suburban development in Hays County during the past 30 years.

Range-wide, previously permitted impacts to the golden-cheeked warbler and black-capped vireo were estimated based on a review of documents posted on the USFWS Southwest Region Ecological Services Electronic Library and publications in the Federal Register since 1994 (the earliest information available on the Federal Register website). According to these documents, the Service has authorized incidental take of the golden-cheeked warbler or is evaluating possible take authorization (typically measured in acres of habitat loss or degradation) for over approximately 41,000 acres of potential golden-cheeked warbler habitat across the range of the species through the issuance of ESA Section 10(a) incidental take permits and Section 7 Biological Opinions related to interagency consultations. Similarly, the Service has authorized incidental take of the black-capped vireo or is evaluating possible take authorization (typically measured in acres of habitat loss or degradation) for approximately 7,900 acres of potential black-capped vireo habitat across the range of the species.

Most of this previously authorized take is associated with the Balcones Canyonlands Conservation Plan (a regional habitat conservation plan operated by the City of Austin and Travis County), the proposed Williamson County Regional Habitat Conservation Plan, an ESA Section 7 consultation with the U. S. Department of Agriculture Natural Resources Conservation Service for land management and restoration practices related to the Leon River Restoration Project in Hamilton and Coryell counties, and another ESA Section 7 consultation with the Department of Defense regarding military training on the Fort Hood Military Reservation in Bell and Coryell counties.

The number of individual golden-cheeked warblers or black-capped vireos (or territories) affected by each of the previously authorized incidental take actions was not consistently reported in Service or Federal Register publications and is unknown.

Projections of recent population and land development trends suggest that approximately 57,700 acres of new land development activities may be reasonably certain to occur within Hays County in the next 30 years. The cumulative extent to which these activities (which include potential projects that would participate in a regional HCP to achieve ESA compliance) would negatively affect the covered species or their habitats cannot be precisely determined. However, based on general predictions regarding the location of new development and the distribution of potential habitat of the covered species across Hays County, the estimated total amount of adverse impact to potential warbler habitat projected to occur during the next 30 years is approximately 22,000 acres. For the black-capped vireo, a similar analysis suggests that 3,300 acres of potential vireo habitat could be lost or degraded during the life of the proposed RHCP or other action alternatives.

The cumulative loss or degradation of potential warbler or black-capped vireo habitat related to future land development activities is likely to affect less than 10 to 15 percent of the total amount of potential habitat currently available in Hays County for these species.

Under the No Action alternative, only a small fraction of this anticipated cumulative habitat loss would be mitigated by conservation actions, as required by the ESA. Each of the regional HCP alternatives, including the proposed RHCP, would be expected to increase ESA compliance and the amount of mitigation provided for the covered species in Hays County.

The cumulative effect of habitat protection in Hays County due to the action alternatives would vary. Golden-cheeked warbler Recovery Region 5 includes approximately 28,440 acres of protected habitat for the golden-cheeked warbler in the Balcones Canyonlands Preserve and the Balcones Canyonlands National Wildlife Refuge. Implementation of the action alternatives will result in the permanent protection of between 3,000 acres and 30,000 acres of golden-cheeked warbler habitat, depending on the alternative selected. The proposed RHCP could contribute approximately 9,000 acres of protected habitat for the golden-cheeked warbler to the system of preserves in Recovery Region 5 (approximately 32 percent of the current total).

The cumulative effect of black-capped vireo habitat protection and management in Hays County under the action alternatives is difficult to predict, since little detailed information is known about the amount or distribution of potential habitat for this species in Hays County or elsewhere across its range. The 2007 status review for the black-capped vireo recommends that the species be down listed from endangered to threatened status (USFWS 2007b), based on observations that total known population of black-capped vireos in Texas is much larger than that known at the time of listing. However, the status review cautions that threats to this species still exist and its recovery depends on the implementation of management actions to reduce these threats (USFWS 2007b). The protection and dedicated long-term management of several hundred to several thousand acres of black-capped vireo habitat in Hays County would have a beneficial cumulative effect on the species, the protection and management of this habitat would help address the remaining threats to the species. The proposed RHCP would contribute approximately 1,300 acres of protected and managed habitat to the existing system of parks and preserves that contain black-capped vireo populations in the proposed recovery region that includes Hays County (i.e., Kickapoo Caverns State Park, Kerr Wildlife Management Area, Love Creek Preserve, Hill Country State Natural Area, Camp Bullis, City of San Antonio lands, Walter Buck Wildlife Management Area, Mason Mountain Wildlife Management Area, and Colorado Bend State Park) (Wilkins et al. 2006).

#### 5.9.2.2 Evaluation and Additional Species

Past, current, and projected local and regional increases in human population and associated land development activities and other land use changes have likely resulted in and are likely to result in the loss, fragmentation, and/or degradation of habitat for one or more of the 56 evaluation or additional species addressed in this EIS. The anticipated cumulative habitat impacts, which would be expected to occur under all four alternatives as described for general wildlife communities in Section 5.9.1.3, would likely lead to reduced populations for one or more of these species.

When compared to the No Action alternative, the cumulative effects of the action alternatives would be generally positive, since each regional HCP alternative would protect large blocks of undeveloped land in Hays County and would providing funding to expand the current body of knowledge regarding the biology, habitat, distribution, and management of these species as a group.

#### 5.9.2.3 Other Special Status Species

As described for the No Action alternative in Section 5.7, the cumulative effects of past, current, and projected local and regional increases in human population and associated land development activities and other land use changes has likely caused and would likely continue to lead to minor to moderate adverse impacts to some of the other special status species in Hays County (i.e., Texas horned lizard and the Cagle's map turtle). However, most of the other special status species would likely remain unaffected or experience only negligible impacts from

the consequences of an expanding human population (see the discussion in Section 5.7). Any anticipated adverse impacts would be expected to occur under all four alternatives.

When compared to the No Action alternative, the cumulative effects of the action alternatives would be generally positive, since each regional HCP alternative would protect large blocks of undeveloped land in Hays County. Depending on the location of these preserves, one or more of the other special status species (particularly the Texas horned lizard and the Cagle's map turtle) could benefit from these actions.

### 5.9.3 Socioeconomic Resources

Recent socioeconomic trends are described in Section 4.9, which are a reflection of the social and economic impacts of population growth and land development in recent years. Generally these socioeconomic indicators (population growth, employment trends, and housing trends) are increasing or improving, resulting in a larger tax base for Hays County.

None of the action alternatives would be expected to have long-term cumulative socioeconomic impacts on the local or regional population, economic trends, County employment rates, per capita income, or real estate transactions. Participants in a regional HCP would enjoy cost and time savings as a result of simplified ESA compliance, but these savings would not be expected to rise to a level that would significantly impact local or regional economies. The Service would experience a long-term beneficial impact under the action alternatives, since each of these regional HCP alternatives would reduce the amount of time and effort the Service would spend on individual ESA consultations.

The time savings for permitting incidental take through a regional HCP would likely result in a portion of the anticipated land development occurring one to two years sooner than would be expected with an individual ESA consultation, and could accelerate the growth of the County's tax base. In addition, creation of large preserves under the action alternatives would likely increase the value of adjacent property, further increasing the County's tax base by an undetermined amount.

Each of the action alternatives requires the dedication of revenues from the County's general maintenance and operations fund, which could negatively affect the County's ability to support services currently funded with these revenues. For the proposed RHCP, the amount of general fund revenues that could be dedicated to the implementation of the plan would be approximately $79.2 million over 30 years (i.e., approximately 3 percent of the cumulative value of the County's general fund during the life of the plan). Comparatively, the Moderate Preserve/Limited Take alternative would only require approximately $40 million from the County's general fund (approximately 1.5 percent of the cumulative value of this fund over 30 years) and the Large-scale Preserve System would require approximately $401 million from the general fund over 30 years (i.e., approximately 15 percent of the fund's cumulative value).

### 5.9.4 Climate Change and Cumulative Impacts

In an October 8, 1997 memorandum, the CEQ issued draft guidelines on how global climate change should be treated in NEPA documents. The CEQ guidance called on Federal agencies to consider in NEPA documents how major Federal actions (such as the proposed Hays County RHCP) could affect sources and sinks of greenhouse gases and how climate change could potentially influence such actions. The CEQ bases this guidance on the NEPA regulations which mandate that all "reasonably foreseeable" environmental impacts of the proposed Federal action have to be considered in the NEPA document. The CEQ considers that there is adequate scientific evidence that indicates that climate change is a "reasonably foreseeable" impact of greenhouse gas emissions.

Furthermore, in November 2007, the Intergovernmental Panel on Climate Change (IPCC) issued its *Fourth Assessment Report*, which concluded that evidence of global warming is now "unequivocal." Some of the IPCC's findings in this report included rising temperatures, rising sea levels, and retreating arctic ice. The IPCC's conclusions have been widely accepted as representing the consensus of opinion in the scientific community. According to the EPA (1997), global mean surface temperatures have increased 0.6 to 1.2 ºF between 1890 and 1996. The nine warmest years in this century have all occurred within the last 14 years. Based on projections made by the IPCC and results from the Hadley Centre's climate model (HadCM2), by the year 2100, temperatures in Texas could increase by approximately 3ºF in spring and 4ºF in other seasons, with variant ranges of 1 to 9ºF (EPA 1997). According to the HadCM2 model, precipitation is estimated to decrease by five to 30 percent in winter and increase by about ten percent in other seasons. Increases in summer could be slightly larger (up to 30 percent) than in spring and fall. As a result, in regard to water resources in Texas, unless increased temperatures are coupled with a strong increase in rainfall, water could become scarcer. A warmer and drier climate would lead to greater evaporation and less water for recharging groundwater aquifers.

The frequency and intensity of extreme weather is of critical importance to ecological systems, and the ability of some plants and animals to migrate and adapt appears to be much slower than the predicted rate of climate change (EPA 1997). According to the Service's Southwest Region, climate change is among the greatest challenges ever faced by a conservation community in conserving fish, wildlife, and their habitats (USFWS 2008). Many avian species are considered to be particularly vulnerable to global warming and associated climate change, as habitat composition shifts (Both and Visser 2001). Global warming also influences the routes of many migratory birds and their annual migration rhythm. Many migratory species change their routes, or shorten or completely cancel their journey as a result of changing temperatures. In 2001, a study of North American warbler species (including the golden-cheeked warbler) found that the range of occurrence had shifted significantly farther north in the past 24 years, by an average of more than 65 miles (Price and Root 2001). The trend of warmer and drier conditions could reduce critical habitat and create further stress on sensitive ecological communities and species, such as the endangered golden-cheeked warbler and black-capped vireo.

Climate change could also affect the abundance and diversity of birds. Warmer winters could increase the survival of birds that live in an area year-round, which could give migratory birds more competition for resources such as food and nest sites when they return to breed in the spring. In turn, a decrease in the total number of migratory birds as well as the number of species would be anticipated (Society for Conservation Biology 2003).

At a local level, anticipated population increases are expected to drive economic growth in Hays County over the next 30 years (i.e., the duration of the RHCP and Permit), as described in Section 4.9. This increase in population will likely be accompanied by an increase in fossil fuel consumption and greenhouse gas emissions related to transportation, energy and heat production, commercial or industrial production, agriculture, and other sectors of the economy. At the same time, population increases will also drive land use changes in Hays County and likely reduce the amount of forest cover present in the county (see Section 4.4 and Section 5.3). Since mature forests can at least temporarily function as carbon sinks by converting carbon dioxide into stable plant materials (i.e., wood), reduction in forest cover can reduce the ability of the natural landscape to sequester carbon dioxide emitted from the burning of fossil fuels.

As such, the No Action alternative would be expected to contribute to the amount of greenhouse gas emissions in the atmosphere and the associated impacts of global climate change described in the paragraphs above. The magnitude of any such contribution by activities in Hays County to the adverse cumulative impacts of global climate change is likely to be so minor as to become negligible on a global scale.

Compared to the No Action alternative, the action alternatives would each protect thousands of acres of mature forest in Hays County. These mature forests are thought to function as "carbon sinks" that trap atmospheric carbon dioxide in long-lived plant materials. While these preserves would be designed to protect habitat for the covered species in perpetuity (particularly mature juniper-oak forest for the golden-cheeked warbler), there is still a possibility for occasional catastrophic events (such as wildfire, exceptional and prolonged drought, or tree diseases) to remove this mature forest cover and release the stored carbon. However, Hays County would implement management practices to replace the lost forest cover under its adaptive management process, which would reestablish the carbon sink. Therefore, each of the action alternatives would protect the ability of at least some mature forest cover in Hays County to function as a carbon sink in perpetuity (even if temporary setbacks occur) and reduce the County's contribution to global climate change. As with the No Action alternative, the magnitude of such a positive contribution would likely be very minor or negligible on a global scale under any of the action alternatives.

While future climate change in Texas may adversely affect the resources analyzed in this EIS (particularly the covered species), as described above, the action alternatives are not expected to contribute cumulatively to such effects should they occur. As a result of climate change, proposed habitat preserves under the action alternatives may increase or decrease in

value to the relevant species over the next 30 years. The Service's Southwest Region has been working with the U.S. Geological Survey, the academic community, and other natural resource management agencies and interest groups to translate available and emerging science into concrete actions that reduce the impacts of a changing climate on the diverse ecosystems in Texas (USFWS 2008). However, at present, there is insufficient knowledge upon which to design alternative or additional mitigation measures within any of the four alternatives to compensate for any adverse effects of climate change. To help deal with this uncertainty, the proposed RHCP includes adaptive management measures and procedures for dealing with changed circumstances such as climate change.

## 5.10 Unavoidable Adverse Impacts

Unavoidable adverse impacts are defined as those that meet the following two criteria: 1) there are no reasonably practicable mitigation measures to eliminate the impacts and 2) there are no reasonable alternatives to the proposed project that would meet the purpose and need of the action, eliminate the impact and not cause other or similar significant adverse impacts (40 CFR 1500.2(e).

It is expected that development in Hays County would continue as trends predict under the No Action alternative, regardless of the implementation of a regional HCP (see Section 4.1). Since potentially adverse impacts associated with anticipated land development would be the same for the No Action and each of the action alternatives, the effects of the action alternatives would be limited to the effects associated with the implementation of their conservation programs. Therefore, all four alternatives discussed in this EIS would result in unavoidable adverse impacts that would include loss of vegetation, native wildlife, and endangered species habitat in Hays County, as well as some adverse impacts to water resources. Mitigation measures discussed in the three action alternatives for the covered species should minimize the loss of habitat for those species (and associated vegetation communities and wildlife) and benefit their conservation.

## 5.11 Irreversible and Irretrievable Commitment of Resources

Under 40 CFR 1502.16, an irreversible commitment of resources is defined as the loss of future options. It primarily applies to non-renewable resources, such as minerals or cultural resources, and to those factors that are renewable only over long time spans, such as soil productivity. Irretrievable commitments represent the loss of production, harvest, or use of renewable resources. These opportunities are foregone for the period of the proposed action, during which other allocations of these resources cannot be realized. These decisions are reversible, but the utilization opportunities foregone are irretrievable.

Under all EIS alternatives, the loss of habitat for the golden-cheeked warbler and black-capped vireo in Hays County would result in irreversible habitat loss for both species. However,

the proposed preserves described for each action alternative would help preserve habitat for these species.

Under all action alternatives, the commitment and funding by Hays County for acquisition and permanent management of mitigation properties would be irreversible. The commitment and funding of mitigation and monitoring activities for the duration of the Permit would also be irretrievable.

## 5.12 Short-term Use of the Environment vs. Long-term Productivity

Pursuant to NEPA regulations (CFR 1502.16), an EIS must consider the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. Short-term uses are those that determine the present quality of life for the public. The quality of life for future generations depends on long-term productivity; the capability of the environment to provide on a sustainable basis.

All four alternatives would result in a short-term loss of habitat for the golden-cheeked warbler and black-capped vireo in Hays County due to human population growth and the associated increase in land development. However, all three action alternatives, particularly the proposed RHCP, would be expected to protect more suitable habitat for these species in the long term through the acquisition and management of their preferred habitat in perpetuity.

# 6.0 PREPARERS AND DEIS RECIPIENTS

## 6.1 Preparers and Contributors

This EIS was prepared for the Service by the Hays County RHCP consultant team. Individuals involved with the preparation of this document are listed below, along with their role in this project, educational background, and experience.

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## 6.2 Draft Environmental Impact Statement Recipients

Copies of the dEIS and dHCP are available at the Hays County Regional Habitat Conservation Plan website at http://hayscountyhcp.com/documents. Alternatively, you may obtain compact disks with electronic copies of these documents by writing to Mr. Adam Zerrenner, Field Supervisor, U.S. Fish and Wildlife Service, 10711 Burnet Road, Suite 200, Austin, TX 78758; calling (512) 490-0057; or faxing (512) 490-0974. A limited number of printed copies of the dEIS and dHCP are also available for public inspection and review at the following locations (by appointment only at government offices):

- San Marcos Public Library (625 E. Hopkins Street, San Marcos, Texas)
- Hays County Precinct 3 Office (14306 Ranch Rd 12 , Wimberley, Texas)
- Hays County Precinct 4 Office (101 Old Fitzhugh Rd, Dripping Springs, Texas)

Persons wishing to review the application may obtain a copy by writing to the Regional Director, U.S. Fish and Wildlife Service, P.O. Box 1306, Room 4012, Albuquerque, NM 87103.

# 7.0 GLOSSARY OF TERMS AND ABBREVIATIONS

**abiotic characteristics** – Non-living chemical and physical factors in the environment such as light, temperature, water and soil.

**affected environment** – The current environmental conditions and resources that may be affected or impacted by the proposed RHCP alternatives.

**aquifer** – Rocks or sediments, such as cavernous limestone and unconsolidated sand, that store, conduct, and yield water in significant quantities for human use.

**Area of Potential Effect** – The focus of operation for the Hays County RHCP located west of Interstate Highway in Hays County, Texas. This is the portion of the county where authorized take of endangered species and the avoidance, minimization, and mitigation measures described by the alternative actions are expected to occur. This area closely corresponds to the Balcones Canyonlands portion of the Edwards Plateau ecoregion.

**Balcones Canyonlands** – The Balcones Canyonlands sub-ecoregion forms the southeastern boundary of the Edwards Plateau ecoregion. The Balcones Canyonlands are highly dissected through the erosion and solution of springs, streams, and rivers working both above and below ground; percolation through the porous limestone contributes to the recharge of the Edwards Aquifer. This Ecoregion supports a number of endemic plants and has a higher representation of deciduous woodland than elsewhere on the Edwards Plateau.

**Balcones Canyonlands Conservation Plan** – The regional habitat conservation plan covering western Travis County. The Balcones Canyonlands Conservation Plan calls for the creation of a preserve system to protect eight endangered species as well as 27 other species believed to be at risk. The Balcones Canyonlands Conservation Plan was approved by the Service in 1996 and has a 30-year term. It allows for incidental take outside of proposed preserve lands, and provides mitigation for new public schools, roads and infrastructure projects of the participating agencies (Travis County, the City of Austin, and the Lower Colorado River Authority). Landowners and developers may elect to participate in the Balcones Canyonlands Conservation Plan to obtain ESA take authorization rather than by seeking authorization directly from the Service.

**Balcones Escarpment** – The Balcones Escarpment is a geologic fault zone several miles wide consisting of several faults, most of which both dip and are downthrown to the east. It extends in a curved line across Texas from Del Rio to the Red River and is visible eastward from Del Rio, where it is about 1,000 feet high, and northeastward from San Antonio to Austin, where it is about 300 feet high. The escarpment, which appears from the plains as a range of wooded hills, separates the Edwards Plateau in the west from the Coastal Plains.

**BCV** – Abbreviation for the "black-capped vireo," which is one of the covered species in the RHCP.

**Biological Advisory Team ("BAT")** – Three or more professional biologists retained to provide guidance for the RHCP, especially with respect to the calculation of harm to the endangered species and the size and configuration of the habitat preserves. The Texas Parks and Wildlife Code § 83.015(c) requires a Biological Advisory Team for RHCPs and specifies that at least one member shall be appointed by the Texas Parks and Wildlife Commission and one by landowner members of the Citizens Advisory Committee. The members of the Biological Advisory Team for this RHCP are experts on the species covered by the RHCP.

**Biological Opinion** – The Service document issued at the conclusion of formal consultation pursuant to section 7(a)(2) of the ESA that generally includes: (1) the opinion of the Fish and Wildlife Service as to whether or not a Federal action is likely to jeopardize the continued existence of listed species, or result in the destruction or adverse modification of designated critical habitat; (2) a summary of the information on which the opinion is based; and (3) a detailed discussion of the effects of the action on listed species or designated critical habitat (50 CFR §§ 402.02, 402.14(h)).

**Blackland Prairie Ecoregion** – This ecoregion represents the southernmost extension of the North American tallgrass prairie and consists of deep, fertile black soils. Because of the fertile soils, much of the original prairie has been plowed to produce food and forage crops. Typically, soils are uniformly dark-colored alkaline clays, often referred to as "black gumbo," interspersed with some gray acidic sandy loams. The landscape is gently rolling to nearly level, and elevations range from 300 to 800 feet above sea level. The dominant vegetation includes big bluestem, little bluestem, Indiangrass, switchgrass, and gramagrass.

**CAMPO** – Acronym for the Capital Area Metropolitan Planning Organization**.**

**candidate species** - Under U.S. Fish and Wildlife's ESA regulations, "…those species for which the Service has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species. Proposal rules have not yet been issued because this action is precluded…" (see 61 FR 7598).

**CEQ** – Acronym for the Council on Environmental Quality. A three-member council created by Title II of NEPA in the Executive Office of the President, responsible for advisory, reporting, and policy analysis functions.

**Citizens Advisory Committee ("CAC")** – Texas Parks and Wildlife Code § 83.016 requires that the plan participants appoint a Citizens Advisory Committee to assist in preparing the RHCP and application for the Federal permit. The state law requires that at least 4 members, or 33 percent, of the Citizens Advisory Committee, whichever is greater, must own undeveloped land or land in agricultural use in the RHCP area. The law also specifies that a landowner member may not be an employee or elected official of a plan participant or any other governmental entity and that the Texas Parks and Wildlife Commission shall appoint one voting representative to the Citizens Advisory Committee.

**CMR** – Acronym for Capitol Market Research.

**Code of Federal Regulations ("CFR")** – A compilation of the general and permanent rules of the executive departments and agencies of the Federal Government as published in the Federal Register. The code is divided into 50 titles that represent broad areas subject to Federal regulation.

**conservation bank** – A conservation bank is a parcel of land containing natural resource values that are conserved and managed in perpetuity, through a conservation easement held by an entity responsible for enforcing the terms of the easement, for specified listed species and used to offset impacts occurring elsewhere to the same resource values on non-bank lands. The values of the natural resources are translated into quantified "credits." Typically, the credit price will include funding for the long-term natural resource management and protection of those values.

**conservation easement** – A recorded legal document established to conserve biological resources in perpetuity, and which requires certain habitat management obligations for the conservation bank lands.

**covered species** – Species included in the RHCP for which incidental take authorization under the ESA is sought.

**critical habitat** – Specific geographic areas, whether occupied by a listed species or not, that are essential for its conservation and that have been formally designated by rule published in the Federal Register.

**discharge** – An outflow of water from a stream, pipe, or ground water system. Includes, but is not limited to, the accidental or intentional spilling, leaking, pumping, emitting, emptying, or dumping of a substance into or on any land or water.

**delisting** – To remove a species from the Federal list of endangered and threatened species (50 CFR 17.11 and 17.12) because the species no longer meets any of the five listing factors provided under section 4(a)(1) of the Endangered Species Act and under which the species was originally listed (i.e., because the species has become extinct or is recovered).

**downlisting** – To reclassify an endangered species to a threatened species based on alleviation of any of the five listing factors provided under section 4(a)(1) of the Endangered Species Act (16 USC § 1533(a)(1)).

**drainage basin** – An area that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water. The term is used synonymously with watershed, river basin, or catchment.

**Edwards Aquifer** – The Edwards Aquifer is an arch-shaped belt of porous, water bearing limestones that comprises one of the major groundwater systems in Texas. It extends 180 miles from Brackettville in Kinney County to Kyle in Hays County. It is the primary source of water for approximately 1.7 million people. While it is a primary source of drinking water, it is the sole-source of water for a unique system of aquatic life, including several threatened and endangered species.

**Edwards Aquifer recharge zone** – The area where a formation allows available water to enter the aquifer. Generally, that area where the Edwards Aquifer and associated limestones crop out in Kinney, Uvalde, Medina, Bexar, Comal, Hays, Travis, and Williamson counties and the outcrops of other formations in proximity to the Edwards limestone, where faulting and fracturing may allow recharge of the surface waters to the Edwards Aquifer.

**Edwards Aquifer Recovery Implementation Program ("EARIP")** – The Edwards Aquifer Recovery Implementation Program is a collaborative, consensus-based stakeholder process in Texas. Many stakeholders are working to develop a plan to protect the Federally listed species potentially affected by the management of the Edwards Aquifer and other activities.

**Edwards Plateau ecoregion** – This Ecoregion comprises an area of central Texas commonly known as the Texas Hill Country. The region is clearly demarcated by the Balcones Fault escarpment to the east and south, but grades into the Chihuahuan Desert to the west and the Great Plains to the north. The region is characterized by steep canyons and stony hills with shallow rocky soils dissected by several river systems. The underlying porous limestone bedrock of the Edward's Plateau is honeycombed caves and sinkhole wich allow recharge into the Edwards Aquifer which lies under the eastern edge of the Plateau. Today, the Edwards Plateau is characterized by grasslands, juniper/oak woodlands, and plateau live oak or mesquite savannah. Open grasslands and savannahs were more common in presettlement times than they are today. Ranching is the primary agricultural industry in the region.

**endangered species** – "Any species [including subspecies or qualifying distinct population segment] which is in danger of extinction throughout all or a significant portion of its range" (section 3(6) of the Endangered Species Act, 16 USC § 1532(6)).

**Endangered Species Act ("ESA")** – 16 USC §§ 1513–1543; Federal legislation that provides means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, and provides a program for the conservation of such endangered and threatened species.

**endemic** – Being native and restricted to a particular geographic region.

**Environmental Impact Statement ("EIS")** – A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act containing, among other things, an analyses of environmental impacts of a proposed action and alternatives considered, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR §§ 1508.11, 1502).

**Environmental Justice** – The pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, and/or socio-economic status. Presidential Executive Order No. 12898 (issued February

11, 1994) requires Federal agencies to respond to the issue of environmental justice by "identify[ing] and address[ing] disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low income populations."

**EPA** – Acronym for U. S. Environmental Protection Agency.

**Evaluation Species of Concern** – Species that are not presently listed as threatened or endangered under the ESA, but are either currently listed in petitions to the Service, or are sufficiently rare and/or endemic that there is a reasonable probability that they may be listed in the future.

**extirpation** – The elimination of a species or subspecies from a particular area, but not from its entire range.

**extinction** - The cessation of existence of a species or group of taxa.

**fee simple land acquisition** – The acquisition or outright purchase of the title, structure and rights associated with real property.

**Federally listed** – The Federal Lists of Endangered and Threatened Wildlife and Plants.

**Federal Register** - Daily publication of the United States government containing all proposed regulations, final regulations, and other activities of the Federal government.

**FTE** – Acronym for full-time employee.

**geologic formation** – The fundamental unit of lithostratigraphy which consists of rock strata that have comparable or similar properties. A formation can be further divided in one or more members or groups.

**GCW** – Abbreviation for the "golden-cheeked warbler," which is the primary covered species in the RHCP.

**habitat** – The location where a particular taxon of plant or animal lives and its surroundings, both living and non-living; the term includes the presence of a group of particular environmental conditions surrounding an organism including air, water, soil, mineral elements, moisture, temperature, and topography.

**habitat conservation plan ("HCP")** – Under section 10(a)(2)(A) of the Endangered Species Act, a planning document that is a mandatory component of an incidental take permit application, also known as a "section 10(a)" or "HCP."

**habitat determination** – Habitat determinations are prepared by Hays County for potential RHCP participants and document the location and extent of potential habitat within a project area, as delineated from the review of background information and the on-site assessment. The habitat determination will also include a calculation of the acreage of potential habitat on a project area.

**harm** – Defined in regulations promulgated by the Department of the Interior to implement the Endangered Species Act as an act "which actually kills or injures" listed wildlife. Harm may include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" (50 CFR § 17.3 (2005)).

**impervious cover** – Land cover that prevents rain from infiltrating into soil, including roofs and pavement.

**incidental take** – Take of any Federally listed wildlife species that is incidental to, but not the purpose of, otherwise lawful activities (see definition for "take") (Endangered Species Act section 10(a)(1)(B)).

**incidental take permit ("Permit")** – A permit that exempts a permittee from the take prohibition of section 9 of the Endangered Species Act issued by the Service pursuant to section 10(a)(1)(B) of the Endangered Species Act. Also sometimes referred to as a "section 10(a)(1)(B)," "section 10 permit," or "ITP." "Permit" in this document refers to the incidental take permit associated with the RHCP.

**interlocal agreement** – A written formal agreement that allows governmental jurisdictions to cooperate with one another in the performance of tasks.

**IPCC** – Acronym for the Intergovernmental Panel on Climate Change.

**issuance criteria** – Before issuing an incidental take permit, the USFWS must find that a habitat conservation plan meets certain "issuance criteria" described in Section 10(a)(2)(B). The USFWS must find that the take of listed species will be incidental to an otherwise lawful activity; that the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking; that adequate funding sources are available and committed to long-term implementation of the plan; and that the taking covered by the permit will not jeopardize the survival and recovery of the species in the wild.

**IUCN** – Acronym for the International Union for Conservation of Nature.

**karst** – A terrain characterized by landforms and subsurface features, such as sinkholes and caves, that are produced by solution of bedrock. Karst areas commonly have few surface streams; most water moves through cavities underground.

**karst features** – Generally, a geologic feature formed directly or indirectly by solution, including caves; often used to describe features that are not large enough to be considered caves, but have some probable relation to subsurface drainage or groundwater movement. These features typically include but are not limited to sinkholes, enlarged fractures, noncavernous springs and seeps, soil pipes, and solution cavities in the epikarst (the highly solutioned zone in karst areas between the land surface and the predominantly unweathered bedrock).

**land in lieu of fees** - The donation of suitable land as an alternative to paying mitigation fees or purchasing credit from a mitigation bank.

**listing** - Species listed as either endangered or threatened under section 4 of the Endangered Species Act (16 USC § 1533).

**mitigation** – Under National Environmental Quality Act regulations, to moderate, reduce or alleviate the impacts of a proposed activity, including: (1) avoiding the impact by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of the action; (3) rectifying the impact by repairing, rehabilitating or restoring the affected environment; (4) reducing or eliminating the impact over time by

preservation and maintenance operations during the life of the action; or (5) compensating for the impact by replacing or providing substitute resources or environments (40 CFR § 1508.20). Under the Endangered Species Act, the applicant must demonstrate that the applicant would, to the maximum extent practicable, undertake to minimize and mitigate the impacts of take of species. According to the HCP Handbook, typical mitigation actions under HCP and incidental take permits include the following: (1) avoiding the impact (to the extent practicable); (2) minimizing the impact; (3) rectifying the impact; (4) reducing or eliminating the impact over time; or (5) compensating for the impact.

**mitigation bank** – A mitigation bank is a parcel of land containing natural resource values that are conserved and managed in perpetuity, through a conservation easement held by an entity responsible for enforcing the terms of the easement, for specified listed species and used to offset impacts occurring elsewhere to the same resource values on non-bank lands. The values of the natural resources are translated into quantified "credits." Typically, the credit price will include funding for the long-term natural resource management and protection of those values.

**mitigation credit** – A unit of measure representing the quantification of species or habitat conservation values within a conservation bank.

**MSA** – Acronym for the Metropolitan Statistical Area.

**National Environmental Policy Act ("NEPA")** – Federal legislation establishing national policy that environmental impacts would be evaluated as an integral part of any major Federal action. Requires the preparation of an Environmental Impact Statement for all major Federal actions significantly affecting the quality of the human environment (42 USC §§ 4321–4327).

**neotenic** - The retention of juvenile characteristics in the adult.

**NLCD** – Acronym for National Land Cover Dataset.

**NMFS** – Acronym for the National Marine Fisheries Service.

**Notice of Intent ("NOI")** – Formal notice in the Federal Register to initiate the NEPA process (required for Environmental Impact Statements).

**oak wilt** – Oak wilt is an infectious disease caused by a fungus, which invades and disables the water-conducting system in susceptible trees. All oaks (*Quercus* spp.) are susceptible to oak wilt to some degree, but some species are more affected.

**Plan Area** – The area of operation for the Hays County RHCP. The Plan Area includes the extent of Hays County, Texas.

**Proposed Action** – Under National Environmental Policy Act regulations, a plan that has a goal which contains sufficient details about the intended actions to be taken or that would result, to allow alternatives to be developed and its environmental impacts to be analyzed (40 CFR §1508.23).

**recharge** – Natural or artificially-induced flow of surface water to an aquifer.

**RHCP** – Abbreviation for the "Hays County Regional Habitat Conservation Plan." The RHCP supports an application by Hays County for an ESA Section 10(a)1(B) incidental take permit from the USFWS. An RHCP typically covers a large geographic area, numerous landowners, and multiple species. Local or regional authorities or entities are often the applicant and permittee, and may be relied upon to implement the mitigation plan under an RHCP.

**RHCP participants** – Any non-Federal party desiring to undertake activities covered by the RHCP, who agrees to comply with the terms and conditions of the RHCP.

**riparian** – Pertaining to the banks of a river, stream, waterway, or other, typically, flowing body of water as well as to plant and animal communities along such bodies of water.

**scoping** – The first document in the environmental review process to receive public comment. It is usually made available just prior to the Public Scoping Meeting.

**Section 7 of the ESA** – The section of the Endangered Species Act that describes the responsibilities of Federal agencies in conserving threatened and endangered species. Section 7(a)(1) requires all Federal agencies "in consultation with and with the assistance of the Secretary [to] utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species." Section 7(a)(2) requires Federal agencies to "ensure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of..." designated critical habitat.

**Section 9 of the ESA** – The section of the Endangered Species Act dealing with prohibited acts, including the take of any listed species without specific authorization of the Service.

**Section 10 of the ESA** – The section of the Endangered Species Act dealing with exceptions to the prohibitions of section 9 of the Endangered Species Act.

**Section 10(a)(1)(B)** – That portion of section 10 of the Endangered Species Act that authorizes the Service to issue permits for the incidental take of threatened or endangered species.

**Service** – Abbreviation for the U.S. Fish and Wildlife Service.

**sinkholes** – A natural depression in the ground's surface related to dissolutional processes, including features formed by concave dissolution of the bedrock, and/or by collapse or subsidence of bedrock or soil into underlying dissolutionally formed cavities.

**species of concern** – Other species addressed in the RHCP that would not be covered for incidental take that may be rare and or endemic to Hays County, and without adequate conservation measures, could become listed by the Service in the future.

**take** – Under section 3(18) of the Endangered Species Act, "…to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" with respect to Federally listed endangered species of wildlife. Federal regulations provide the same taking prohibitions for threatened wildlife species (50 CFR 17.31(a)).

**Texas Open Meetings Act** – Under the Texas Open Meetings Act (the Act), every regular, special, or called meeting of a governmental body, including a city council and most

boards and commissions (depending on membership and authority), must be open to the public and comply with all the requirements of the Act. The Act does not apply to purely social gatherings or conventions and workshops, as long as any discussion of city business is incidental to the purpose of the gathering.

**TCEQ** - Acronym for the Texas Commission on Environmental Quality.

**threatened species** – "Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (Endangered Species Act § 3 (20), 16 USC § 1532(20)].

**TNRIS** – Acronym for Texas Natural Resources Information Service.

**Texas Pollutant Discharge Elimination System ("TPDES")** – Texas Pollution Discharge Elimination System. Texas' state water quality program authorized by the EPA in September 1998; it has Federal regulatory authority over discharges of pollutants to Texas surface waters.

**TPWD** – Acronym for the Texas Parks and Wildlife Department.

**TWDC** – Acronym for the Texas Water Development Board

**TXDOT** – Acronym for the Texas Department of Transportation.

**TXP** – an Austin-based economic analysis and public policy consulting firm.

**USFWS** – Acronym for the U.S. Fish and Wildlife Service.

**vegetational succession** – Succession is the relatively gradual change in structure and composition that arises as the vegetation modifies various environmental variables over time, including light, water and nutrient levels. These modifications change the suite of species most adapted to grow, survive and reproduce in an area, causing floristic changes.

**Water Pollution Abatement Plan** – A water pollution abatement plan (WPAP) is required by TCEQ for any regulated activity proposed on the Edwards Aquifer recharge zone. This includes any many construction-related activities on the recharge zone, which may pose a potential for contaminating the Edwards Aquifer and hydrologically connected surface streams.

**wetlands** – Wetlands are those areas where water saturation is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the surrounding environment.

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