DRAFT

ENVIRONMENTAL IMPACT STATEMENT

FOR THE

SOUTHERN EDWARDS PLATEAU HABITAT CONSERVATION PLAN

EDITED BY:

U.S. Fish and Wildlife Service
Austin Ecological Services Field Office
10711 Burnet Road, Suite 200
Austin, Texas 78758-4460

PREPARED BY:

JACOBS®

IN COLLABORATION WITH:

Bowman Consulting, Inc.
Zara Environmental, LLC
Ximenes & Associates
Wendall Davis & Associates
Jackson Walker, LLP

OCTOBER 2014

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

FOR THE

SOUTHERN EDWARDS PLATEAU HABITAT CONSERVATION PLAN

Type of Action:	Draft, available for 90-day public comment period
Lead Agency:	U.S. Department of Interior, Fish and Wildlife Service
Responsible Official:	Adam Zerrenner Field Supervisor U.S. Fish and Wildlife Service 10711 Burnet Road, Suite 200 Austin, Texas 78758
For Information:	Christina Williams Fish and Wildlife Biologist U.S. Fish and Wildlife Service 10711 Burnet Road, Suite 200 Austin, Texas 78758

This draft Environmental Impact Statement evaluates the proposed issuance by the U.S. Fish Wildlife Service of a requested permit pursuant to section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended. The applicants are jointly the City of San Antonio and Bexar County, Texas. The applicants are seeking an incidental take permit to cover take of nine threatened or endangered species and to implement a conservation plan to protect and preserve these species and the habitats on which they depend.

TABLE OF CONTENTS

Executive Summary ..... ES-i
Purpose and Need ..... ES-i
Scoping and Public Participation ..... ES-i
Alternatives Considered ..... ES-ii
No Action Alternative ..... ES-iv
Action Alternatives ..... ES-iv
Affected Environment and Consequences ..... ES-v
Affected Environment ..... ES-v
Environmental Consequences ..... ES-vi
Chapter 1 ..... **1-1**
Introduction, Purpose and Need **1-1**
1.1 Introduction 1-1
1.1.1 SEP-HCP Plan Area and Enrollment Area 1-1
1.1.2 Southern Edwards Plateau Habitat Conservation Plan (SEP-HCP) 1-3
1.2 Purpose and Need for Action 1-5
1.2.1 Protect and Manage Habitat of Threatened and Endangered Species at a Regional Scale 1-5
1.2.2 Expedite the Incidental Take Permitting Process 1-7
1.2.3 Increase Compliance with ESA 1-7
1.2.4 Address Compatibility Issues between the Mission of Camp Bullis and the Needs of Endangered Species 1-8
1.2.5 Support Economic Growth 1-8
1.2.6 Involve a Diversity of Stakeholders and Seek Partnerships 1-8
1.2.7 Implement a Locally-appropriate and Cost-effective Habitat Conservation Plan 1-8
1.2.8 Leverage Existing Conservation Resources 1-9
1.3 Regulatory Framework 1-9
1.3.1 Endangered Species Act 1-9
1.3.2 National Environmental Policy Act (NEPA) 1-9
1.3.3 Texas State Law Relevant to Regional Habitat Conservation Plans 1-10
1.4 Decision Needed 1-11
Chapter 2 ..... **2-12**
Scoping and Public Participation **2-12**
2.1 Scoping 2-12
2.1.1 Notice of Intent 2-12
2.1.2 Public Scoping Meetings 2-12
2.1.3 Scoping Comments 2-13
2.1.4 Agency Scoping Process 2-22
2.1.5 SEP-HCP Website 2-23
2.2 Recipients 2-23
Chapter 3 ..... **3-27**
Alternatives **3-27**
3.1 Alternatives Development Process 3-27

3.1.1 Regulatory Programs 3-27
3.1.2 Pre-determined Preserves 3-27
3.1.3 The Action Alternatives 3-28
3.2 Description of Alternatives Considered for Detailed Study 3-28
3.2.1 No Action Alternative 3-28
3.2.2 Common Characteristics of the Action Alternatives 3-29
3.2.3 Proposed SEP-HCP Alternative 3-32
3.2.4 10% Participation Alternative 3-33
3.2.5 Single-County Alternative 3-34
3.2.6 Increased Mitigation Alternative 3-34
3.3 Comparison of Proposed Alternatives 3-35
Chapter 4 4-38
Affected Environment & Environmental Consequences 4-38
4.1 the Affected Environment 4-38
4.1.1 Issues and Resources Considered but Dismissed from Detailed Analysis 4-38
4.2 Assessment of Impacts 4-43
4.2.1 Types of Impacts 4-43
4.3 Water Resources 4-44
4.3.1 Affected Environment 4-44
4.3.2 Environmental Consequences 4-53
4.4 Vegetation 4-57
4.4.1 Affected Environment 4-57
4.4.2 Environmental Consequences 4-61
4.5 General Wildlife 4-64
4.5.1 Affected Environment 4-64
4.5.2 Environmental Consequences 4-68
4.6 Threatened and endangered Species covered by the sep-hcp 4-71
4.6.1 Golden-cheeked Warbler – Affected Environment 4-71
4.6.2 Golden-cheeked Warbler - Environmental Consequences 4-72
4.6.3 Black-capped Vireo - Affected Environment 4-78
4.6.4 Black-capped Vireo - Environmental Consequences 4-78
4.6.5 Covered Karst Invertebrates - Affected Environment 4-84
4.6.6 Covered Karst Invertebrates - Environmental Consequences 4-84
4.7 SocioEconomic Resources 4-87
4.7.1 Socioeconomic Resources - Affected Environment 4-87
4.7.2 Socioeconomic Resources - Environmental Consequences 4-93
4.8 Climate Change 4-97
4.8.1 Affected Environment 4-97
4.8.2 Environmental Consequences 4-100
4.9 Cumulative Impacts 4-103
4.10 Unavoidable Impacts 4-107
4.11 Irreversible and Irretrievable Commitment of Resources 4-107
4.12 Short-term Use of the Environment vs. Long-term Productivity 4-107

Chapter 5 Preparers **5-1**
5.1 Preparers and Contributors 5-1
Chapter 6 Glossary of Terms and Abbreviations **6-3**
6.1 Glossary of Terms 6-3
6.2 List of Abbreviations 6-8
Chapter 7 References Cited **7-1**

LIST OF FIGURES

Figure 1-1: SEP-HCP Plan Area and Enrollment Area 1-2
Figure 1-2: Permitting Process – Without a HCP vs. With a HCP 1-7
Figure 4-1: Major and minor aquifers of the Plan Area 4-45
Figure 4-2: River Basins and Sub-Basins 4-49
Figure 4-3: Impaired Waters in the Plan Area 4-52
Figure 4-4: Ecoregions in the SEP-HCP Plan Area 4-59
Figure 4-5: 1992 GCWA Recovery Region Boundaries 4-75
Figure 4-6: 1991 BCVI Recovery Region Boundaries 4-80

LIST OF TABLES

Table ES-1: Summary of Environmental Impacts for each Alternative* ES-7
Table 1-1: Covered and Voluntarily Conserved Species in the Plan Area 1-4
Table 1-2: Estimated Habitat Loss within the Plan Area (2010 to 2040) 1-6
Table 2-1: Dates and Locations of Public Scooping Meetings 2-12
Table 2-2: Attendance 2-13
Table 2-3: CAC Meetings 2-17
Table 2-4: BAT Meetings 2-19
Table 3-1: Take Request, Proposed Conservation & Mitigation – Proposed SEP-HCP Alternative 3-32
Table 3-2: Take Request, Proposed Conservation & Mitigation – 10% Participation Alternative 3-33
Table 3-3: Take Request, Proposed Conservation & Mitigation – Single-County Alternative 3-34
Table 3-4: Take Request, Proposed Conservation & Mitigation – Increased Mitigation Alternative 3-35
Table 3-5: Comparison of Proposed Alternatives 3-35
Table 4-1: 2012 impaired waters in the Plan Area and their associated impairment category 4-51
Table 4-2: Ecoregions within the Plan Area 4-58
Table 4-3: Vegetation Types within the Plan Area 4-61
Table 4-4: Native Vertebrate Wildlife Communities by Taxon and Ecological Region within the Plan Area (Species Diversity) 4-65
Table 4-5: Voluntarily Conserved Species 4-65
Table 4-7: Population Growth 2000 to 2010 4-87
Table 4-8: Projected Population Growth 2010 to 2040 4-88
Table 4-9: Employment by Industry - 2010 4-86
Table 4-10: Household Income - 2010 4-87

Table 4-11: Projected Employment by Industry in the Plan Area* – 2010 to 2040 4-88
Table 4-12: Estimated Households and Housing Units (2009) 4-89
Table 4-13: Projected Housing Units (2010, 2020, 2030 & 2040) 4-89
Table 4-14: Land Use Categories and Descriptions 4-90
Table 4-15: General Land Uses within the Plan Area in 2009 (acres) 4-91
Table 4-16: Projected Distribution of Land Uses in the Plan Area in 2040 (acres) 4-92
Table 4-17: Acres of New Development Projected in the Plan Area (2009-2040) 4-92

LIST OF APPENDICES

Appendix A: Notice of Intent
Appendix B: Scoping Meeting Announcements
Appendix C: Scoping Meeting Materials
Appendix D: Summary of Public Comments
Appendix E: Agency Correspondence

EXECUTIVE SUMMARY

This Draft Environmental Impact Statement (EIS) describes potential impacts of 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 Bexar County and the City of San Antonio, Texas (the Applicants) to authorize incidental take of nine federally endangered species. Referred to as the Covered Species, they include the golden-cheeked warbler (*Dendroica chrysoparia*; GCWA), black-capped vireo (*Vireo atricapilla*; BCVI), Government Canyon bat cave spider (*Neoleptoneta microps*), Madla Cave meshweaver (*Cicurina madla*), Braken Cave meshweaver (*Cicurina venii*), Government Canyon Bat Cave meshweaver (*Cicurina vespera*), two beetles with no common name (*Rhadine exilis* and *Rhadine infernalis*) and the Helotes mold beetle (*Batrisodes venyivi*).

The Service is the lead federal agency with responsibility for issuing the incidental take permit (ITP or Permit) as described in the Southern Edwards Plateau Habitat Conservation Plan (SEP-HCP or the Plan). The issuance of the Permit is the Proposed Action and the preferred alternative evaluated in this EIS. The Permit would authorize a limited amount of incidental take of the Covered Species within the jurisdictions of Bexar County and/or the City of San Antonio (excluding any portion of Comal County) (the Enrollment Area). In return, the SEP-HCP implements conservation measures for the Covered Species in Bexar, Comal, Blanco, Kendall, Kerr, Bandera, and Medina counties (the Plan Area). This EIS considers the potential impacts of the Permit and the conservation measures in the Plan Area. A detailed description of the Plan Area can be found in Section 2.3 of the SEP-HCP document.

PURPOSE AND NEED

The greater San Antonio area is positioned at the southeastern edge of the Edwards Plateau ecoregion in Texas. This ecoregion supports several federally threatened or endangered species that occupy a variety of habitats, including mature woodlands, early-growth shrublands, and subterranean caves. The natural resources of the Edwards Plateau have also been a significant attraction for human communities. Over the past 30 years, the human population in and around San Antonio increased by more than 75 percent (U.S. Census Bureau 1995, 2000, 2010). The economy of the San Antonio metropolitan area is expected to continue drawing people to the region, with a projected population increase of more than 60 percent over the next 30 years (ESRI Business Solutions 2009, Wendell Davis and Associates 2010a). As a result of these land development activities, habitats for federally threatened or endangered species are being impacted. The Service identifies habitat loss and degradation as the primary factors threatening the survival and recovery of many of these species.

The Applicants need a long-term, comprehensive solution to allow otherwise lawful activities that could result in take of covered species while assuring compliance with the ESA. Therefore, the Applicants have requested an ITP from the Service, which would permit the incidental take of ESA-listed species resulting from otherwise lawful activities (see Chapter 3 of the SEP-HCP for a detailed description of Covered Activities). The proposed federal action is the issuance of a section 10(a)(1)(B) permit by the Service for a term of 30 years to allow incidental take of Covered Species. The Service must consider the request and determine if the SEP-HCP meets the issuance criteria in the ESA before issuing an ITP.

SCOPING AND PUBLIC PARTICIPATION

Public scoping for this EIS began with the publication of a Notice of Intent to prepare an EIS (NOI) in the *Federal Register* on Wednesday, April 27, 2011 (**Appendix A**). The Service issued this notice to advise the public that an EIS will be prepared for the SEP-HCP and that scoping meetings will be held

in June 2011. In addition to the *Federal Register*, meeting announcements were published in the *Blanco County News*, *The Helotes Echo*, *Kerrville Daily Times*, *The Bandera Bulletin*, *San Antonio Express News*, *La Prensa* (Spanish), *Hondo Anvil Herald* and *The Boerne Star* (**Appendix B**). Meeting details were also posted to several websites including the SEP-HCP project website and websites managed by the Service, the Hill Country Alliance, and the Texas Water Development Board. Members of the Community Advisory Committee (CAC), Biological Advisory Team (BAT), and the Agency Oversight Group (AOG) were also sent invitations to the public scoping meetings. Five public scoping meetings were held throughout the Plan Area in Bandera, Boerne, Blanco, Kerrville, and Helotes, Texas, between June 6, 2011, and June 14, 2011, to engage the community, share information and ask the community for their input. All five meetings followed the same format which began with an open house from 5:30 p.m. to 6:00 p.m., a formal presentation at 6:00 p.m. followed by a continuation of the open house, and concluded with a moderated question and answer session at 7:00 p.m. The meetings provided opportunities for the public to learn about and comment on the proposed Permit and SEP-HCP as it was being developed.

A total of 211 people attended the 5 public scoping meetings including 194 members of the public, 3 media outlets, and 14 elected officials. The public comment period extended from April 27, 2011 through July 26, 2011. During this time 66 public comments were received. Comments and responses are summarized in **Section 2.1.3**.

In June 2011, letters were sent to 24 federal, state and local agencies with the NOI attached requesting comments on the potential resources that could be affected or issues that could arise by the issuance of the Permit.

In addition to the public scoping process, Bexar County and the City of San Antonio instituted two advisory committees: the CAC and the BAT. These committees provided guidance to the Applicants during the development of the SEP-HCP. All meetings of these committees were subject to the Texas Open Meetings Act and agendas, materials, and minutes were posted on the SEP-HCP website.

ALTERNATIVES CONSIDERED

The Applicants formed two advisory groups to provide input on the development of the SEP-HCP and the range of potential alternatives for the EIS. The input received during the scoping process helped refine a preliminary range of alternatives into five Alternatives, including the No Action Alternative. The four Action Alternatives share several common characteristics:

> **Covered Species:** All four Action Alternatives propose the incidental take of nine federally listed endangered species.
>
> **Voluntarily Conserved Species:** All four Action Alternatives will result in habitat that will be impacted and habitat that will be protected for species that are not federally listed as threatened or endangered but that may share similar habitats as the Covered Species. Voluntarily Conserved Species will not be covered under the Proposed Action but may be affected.
> **Enrollment Area:** All four Action Alternatives propose an Enrollment Area that includes the jurisdictions of Bexar County and the City of San Antonio including its extraterritorial jurisdiction (ETJ) (the area where the City of San Antonio has the ability to exercise its legal authority beyond its city limits), and the area where the City of San Antonio's ETJ will likely be

expanded over the 30 year timeframe of the SEP-HCP. The Enrollment Area excludes any portion of Comal County.

Covered Activities: Covered Activities are all otherwise lawful land development projects within the Enrollment Area; they may include, but are not limited to, construction and maintenance for land development, utilities, and transportation infrastructure, as well as activities associated with the management and monitoring, and research activities on SEP-HCP preserves that may be located anywhere in the Plan Area. The ITP associated with the SEP-HCP will authorize a certain amount of incidental take of the Covered Species. Landowners, developers, and others conducting non-federal Covered Activities within the Enrollment Area may be eligible to achieve ESA compliance through the Plan. Those that complete the enrollment process become SEP-HCP Participants. SEP-HCP Participants voluntarily elect to utilize the SEP-HCP to comply with the ESA.

Mitigation Measures for BCVI and GCWA: Preservation Credits will be created by the SEP-HCP for each acre of GCWA and BCVI habitat protected, such that each acre of protected habitat yields one Preservation Credit. Credit can be acquired by conserving previously unprotected habitat in the Plan Area or by purchasing credits from an existing Service-approved conservation bank. All Action Alternatives assume that the GCWA and BCVI preserve systems will be composed of consolidated tracts of 500 acres or larger and/or will generate at least 500 GCWA Preservation Credits or 100 BCVI Preservation Credits in combination with adjacent protected properties. Preserve land will include some areas of non-habitat buffers; as such the SEP-HCP will purchase more land than needed to generate the appropriate number of Preservation Credits.

Mitigation Measures for Covered Karst Invertebrates: For all Action Alternatives, the SEP-HCP will establish new preserves with Covered Karst Invertebrates, which will be distributed across the karst fauna regions (KFRs) in Bexar County (except Alamo Heights KFR). Impacts to the karst invertebrates will be assessed based on the location of specific land development activities (the Covered Activities) from known occupied karst features that occur within or adjacent to the Covered Activities. Covered Activities will occur outside a 750-foot buffer around a feature's entrance (Occupied Cave Zone) until certain conservation baselines are achieved. The conservation baselines are derived from the Service's recovery standards for downlisting each of the Covered Karst Invertebrates. Covered Activities will occur outside Service-designated Critical Habitat unless the Service determines, on a case-by-case basis, that the activities will not adversely modify such habitat. If access to an Occupied Cave Zone is allowed, Participants will be assessed a flat fee.

Preserve Management and Monitoring: To ensure the permanent protection and management of Covered Species' habitat, the Applicants will establish a preserve management and monitoring process. In addition, the Applicants will provide the public with informational materials about the Covered Species and the SEP-HCP and will contribute to the understanding of the biology, ecology and conservation of the Covered Species by providing access, on a limited basis, to SEP-HCP preserves for research purposes.

Cost Estimates: The cost estimates for all Action Alternatives assume that the entire allocation of incidental take authorization will be used by the SEP-HCP Participants within the 30-year timeframe of the SEP-HCP.

Financing: All of the Action Alternatives will implement a conservation program which will include the purchase and management of preserve land for the Covered Species. The funding for these actions will come from fees collected from SEP-HCP Participants and public funding sources. However, each Action Alternative contemplates a different distribution of these two sources of revenue, as described below.

- **Proposed SEP-HCP Alternative:** 74% from participation fees, 26% from public sources
- **10% Participation Alternative:** 47% from participation fees, 53% from public sources
- **Single-County Alternative:** 46% from participation fees, 54% from public sources
- **Increased Mitigation Alternative:** 37% from participation fees, 63% from public sources

ESA Compliance: The time and steps, and therefore the cost, required to comply with the ESA will be reduced, compared to the No Action Alternative, for all Action Alternatives.

No Action Alternative

The No Action Alternative represents the status quo, whereby individuals seeking authorization for incidental take of an endangered species must work directly with the Service; they will be responsible for completing the permitting process and complying with other state and federal requirements associated with the issuance of a federal permit. Bexar County and the City of San Antonio will not seek a broad-scale and long-term ITP from the Service. Bexar County will not implement the SEP-HCP and will not sponsor a locally-administered program to streamline ESA compliance. Bexar County will have no involvement with ESA compliance for projects conducted by other entities. If the SEP-HCP is not implemented the cost of ESA compliance will remain the responsibility of the individual seeking authorization for incidental take of an endangered species, and no public funding will be provided.

Action Alternatives

Proposed SEP-HCP Alternative

The Proposed SEP-HCP Alternative assumes 50 percent of the development activities requiring an ITP for the Covered Species over the next 30 years will participate in the SEP-HCP. The incidental take represents 50 percent of the projected GCWA and BCVI habitat loss and 20 percent of the loss of Karst Zones 1-4 resulting from land development projects within a defined Enrollment Area over the next 30 years. The Proposed SEP-HCP Alternative requires a mitigation ratio of 2 to 1 for direct impacts to GCWA or BCVI; this means that two acres of preserve will be required to mitigate for every acre of take.

10% Participation Alternative

The 10% Participation Alternative represents the alternative with a reduced amount of take in the same Enrollment Area as the Proposed SEP-HCP Alternative. It assumes 10 percent of the development activities requiring an ITP for the Covered Species over the next 30 years will participate in the SEP-HCP. The incidental take request represents 10 percent of the projected GCWA and BCVI habitat loss and 10 percent of the loss of Karst Zones 1-4 resulting from development within the Enrollment Area over the next 30 years. The 10% Participation Alternative proposes a 2 to 1 mitigation ratio for direct impacts to the GCWA and BCVI; the same as the Proposed SEP-HCP Alternative.

Single County Alternative

The Single-County Alternative proposes that all incidental take and conservation actions will occur within Bexar County and/or within 10 miles of the Bexar County border. It was modeled off of other single-county HCPs in Central Texas, such as the Comal County HCP and the Hays County HCP. This alternative proposes the same amount of take for the Covered Species as the Proposed SEP-HCP Alternative; however, it proposes one-half of the preserve for GCWA and BCVI and increased mitigation costs. The reduced conservation levels with the Single-County Alternative are based on a 1 to 1 direct impact mitigation ratio as compared to 2 to 1 direct impact mitigation with the Proposed SEP-HCP Alternative. The Single-County Alternative will have higher costs per acre of habitat conservation than the other Action Alternatives because the cost of land in the more developed Bexar County is higher.

Increased Mitigation Alternative

The Increased Mitigation Alternative incorporates input received from the CAC and the BAT. These advisory groups suggested greater protection measures for the Covered Species than the other Action Alternatives. This includes higher proposed habitat conservation for the GCWA (3 to 1 direct impact mitigation) and two times the required amount of preserve needed to achieve down-listing for the Covered Karst Invertebrates. The advisory groups also suggested that 60 percent of the GCWA preserve should be within Bexar County and/or within 5 miles of the county border. Like the Proposed SEP-HCP Alternative, the Increased Mitigation Alternative assumes 50 percent of the development activities requiring an ITP for the Covered Species over the next 30 years will participate in the SEP-HCP, which represents 50 percent of the projected GCWA and BCVI habitat loss and 20 percent of the loss of Karst Zones 1-4 resulting from land development projects within the Enrollment Area over the next 30 years.

AFFECTED ENVIRONMENT AND CONSEQUENCES

Affected Environment

The description of the affected environment describes the current environmental conditions considered by the Service to be potentially affected by the Proposed Action. In order to provide a succinct description of those resources that may be affected by the Proposed Action and a level of analysis that is commensurate with the importance of the impact, some resources and topics are analyzed in detail and others are considered but dismissed from further analysis.

The resources described and analyzed in detail in this EIS are:

- **Water Resources:** Environmentally sensitive surface and groundwater resources occur throughout the SEP-HCP Plan Area and the water quality of these resources is a topic of concern in the region. These water resources may affect the health of the Covered Species' habitats and may be essential habitat for other wildlife. Water resources, where they overlap with potential habitat for the Covered Species, could be affected by the Proposed Action including habitat loss and habitat conservation.
- **Vegetation:** Vegetation within the SEP-HCP Enrollment Area could be affected by the Proposed Action because take of Covered Species is expressed as the number of acres of potentially suitable habitat that will be modified or lost as a result of Covered Activities, and because mitigation for that take will be the conservation and management in perpetuity of any designated acreage of suitable habitat in the Plan Area for the Covered Species.
- **General Wildlife:** Wildlife occupying the habitats that may be lost or modified that result from Covered Activities and areas protected and managed as mitigation may be affected by the Proposed Action.

- **SEP-HCP Covered Species:** The Covered Species include two federally listed birds, the GCWA and the BCVI, and seven federally listed karst invertebrate species. The Proposed Action, mitigation, or administration and funding for each alternative will affect the Covered Species through the authorized take and through the conservation of their habitat as mitigation.
- **Voluntarily Conserved Species:** The Voluntarily Conserved Species represent 17 rare or sensitive species that occur in habitats that are generally associated with areas used by the Covered Species. These Voluntarily Conserved Species are not federally listed as threatened or endangered and will not be covered under the Proposed Action; however, they may be affected in terms of habitat that will be taken and habitat that will be protected.
- **Socioeconomic Resources:** Although implementation of the Action Alternatives is not anticipated to affect overall socioeconomic trends within the SEP-HCP Plan Area (such as population, demographics, income, employment, and housing) they are important in understanding the interaction between people and the natural environment. The Action Alternatives have the potential to affect the cost of ESA compliance for land owners and developers and for the Service.
- **Climate Change:** Climate change refers to a major shift in weather patterns over a number of years due to changes in atmospheric composition from natural and human factors.

Resources or topics that were considered but dismissed from detailed analysis include energy and depleteable resources; prime and unique farmlands; public health and safety; wetlands and floodplains; cultural resources; geology; air quality; noise; environmental justice; wild and scenic rivers; and national forests and grasslands. These resources are not likely to be affected by the authorized take, proposed mitigation, or funding and administration of the Action Alternatives (see **Section 4.1.1 Issues and Resources Considered but Dismissed from Detailed Analysis** for more details).

Environmental Consequences

National Environmental Policy Act (NEPA) regulations require the analysis of a No Action Alternative as a benchmark that enables decision makers to assess the magnitude of the environmental impacts of the Action Alternatives (40 CFR 1502.14). Under the No Action Alternative, the current trends projected for human population growth and associated land development in Bexar County and the City of San Antonio, Texas will continue and impacts to listed species will 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 from the proposed federal action. However, the SEP-HCP will influence where development occurs around caves and also may influence the amount of habitat a developer chooses to destroy versus paying mitigation fees.

The timing and location of development projects are influenced most by market conditions; some projects are likely to find that the proposed SEP-HCP does not make a significant difference in terms of when and where to develop. Therefore, it is reasonable to assume that the Action Alternatives, compared to the No Action Alternative, will have only minor impacts on the extent, timing and placement of development and any associated impacts to habitat for the Covered Species over the next 30 years. Since there will likely be no significant difference in land development patterns across the Enrollment Area under the No Action or the Action Alternatives, consideration of environmental consequences in this EIS are limited to the potential impacts of the take that will be authorized by the permit, the proposed mitigation activities, and the funding and administration of the SEP-HCP.
This EIS provides a detailed impact assessment of relevant resources and topics for the No Action Alternative and the Action Alternatives throughout the Plan Area. This means that if the SEP-HCP is

implemented, the relevant impacts of ESA compliance options will have been considered in this EIS. Although this does not relieve project proponents who choose options other than participation in the SEP-HCP from compiling necessary environmental analyses at the time they commence their projects, it does provide assurance that the SEP-HCP is implemented with a full understanding of the possible impact scenarios, regardless of the level of landowner participation in the SEP-HCP. This EIS will also serve as a valuable reference point for projects that do not use the SEP-HCP compliance option.

The EIS contains a resource-by-resource analysis of direct, indirect and cumulative impacts for each of the affected resources. A summary of the anticipated impacts of the No Action and the four Action Alternatives is provided in **Table ES-1** below.

Table ES-1: Summary of Environmental Impacts for each Alternative*

Resource/ Topic	No Action	Proposed SEP-HCP	10% Participation	Single-County	Increased Mitigation
Land Development Trends	Land development trends will continue as projected in the SEP-HCP Plan Area. 241,152 acres in the Plan Area are projected to be converted to a developed land use between 2010 and 2040, of which 51,150 acres will result in habitat loss for the GCWA, 10,084 acres will result in habitat loss for the BCVI, and 247 occupied karst features will be impacted. Compliance with the ESA will occur on a project-by-project basis via take authorizations from the Service. Land development activities will have a **minor to moderate adverse impact** on the Covered Species.	Land development trends will continue as projected in the SEP-HCP Plan Area resulting in the loss of habitat for the Covered Species. The SEP-HCP will not substantially affect the amount, timing, or location of land development over the next 30 years, with the exception of preventing future development from occurring in areas that are designated as preserve. These activities will have a similar impact as the No Action Alternative and result in **minor to moderate adverse impacts*** on the Covered Species. Unlike the No Action Alternative, incidental take authorization will be administered by the SEP-HCP for Covered Species including…			
		9,371 acres for the GCWA, 2,640 acres for the BCVI, and 21,086 acres of Karst Zones 1-4. This alternative assumes a 50 percent participation rate which will provide for 50 percent of the projected habitat loss for the GCWA and the BCVI and 20 percent of the projected habitat loss for Covered Karst Invertebrates in the Enrollment Area over 30 years.	2,100 acres for the GCWA, 566 acres for the BCVI, and 10,543 acres of Karst Zones 1-4. This alternative assumes a 10 percent participation rate which will provide for 10 percent of the projected habitat loss for the GCWA, BCVI and Covered Karst Invertebrates in the Enrollment Area over 30 years.	9,371 acres for the GCWA, 2,640 acres for the BCVI, and 21,086 acres of Karst Zones 1-4. This alternative assumes a 50 percent participation rate which will provide for 50 percent of the projected habitat loss for the GCWA and the BCVI and 20 percent of the projected loss for Covered Karst Invertebrates in the Enrollment Area over 30 years.	9,371 acres for the GCWA, 2,640 acres for the BCVI, and 21,086 acres of Karst Zones 1-4. This alternative assumes a 50 percent participation rate which will provide for 50 percent of the projected habitat loss for the GCWA and the BCVI and 20 percent of the projected loss for Covered Karst Invertebrates in the Enrollment Area over 30 years.
Water Resources	Potential adverse impacts to water resources associated with land development	Potential adverse impacts to water resources associated with land development activities are similar to the No Action Alternative but are moderated by existing regulations. The conservation of approximately…			

Resource/ Topic	No Action	Proposed SEP-HCP	10% Participation	Single-County	Increased Mitigation
	activities are moderated by existing regulatory programs and mitigation from ESA take authorization (the Edwards Aquifer HCP). **Minor to moderate adverse impacts** overall will occur.	31,030 acres from land development activities within the SEP-HCP Plan Area could result in **negligible to minor beneficial impacts** to water resources compared to No Action.	7,390 acres from land development activities within the SEP-HCP Plan Area could result in **negligible beneficial impacts** to water resources compared to No Action.	16,014 acres from land development activities within and adjacent to Bexar County could result in **negligible to minor beneficial impacts** to water resources compared to No Action.	16,014 acres from land development activities within and adjacent to Bexar County could result in **negligible to minor beneficial impacts** to water resources compared to No Action.
Vegetation	Anticipated land development will generally reduce the extent and sustainability of native vegetation communities. Some adverse impacts may be moderated by existing regulations and through other park/open space initiatives as well as ESA take authorizations. Overall **moderate adverse impacts** to vegetation are expected.	Potential adverse impacts to vegetation associated with land development activities are similar to the No Action Alternative; some may be moderated by existing regulations and through other park/open space initiatives. The conservation of approximately…			
		31,030 acres from land development activities within the SEP-HCP Plan Area could result in **moderate beneficial impacts** to vegetation compared to No Action.	7,390 acres from land development activities within the SEP-HCP Plan Area could result in **minor beneficial impacts** to vegetation compared to No Action.	16,014 acres from land development activities within and adjacent to Bexar County could result in **minor to moderate beneficial impacts** to vegetation compared to No Action.	43,741 acres from land development activities within the SEP-HCP Plan Area could result in **moderate beneficial impacts** to vegetation compared to No Action.
General Wildlife	Anticipated land development will generally reduce wildlife habitat, may	Potential adverse impacts to wildlife associated with land development activities are similar to the No Action Alternative; some urban-adapted species could benefit. The conservation of approximately…			

Resource/ Topic	No Action	Proposed SEP-HCP	10% Participation	Single-County	Increased Mitigation
	introduce non-native species, and disrupt the balance of natural wildlife communities; however, some urban-adapted species could benefit. Adverse impacts may be moderated by existing regulations, and through other parks/open space programs, and ESA take authorizations. Overall, **moderate adverse impacts** to native wildlife communities are expected.	31,030 acres from land development activities within the SEP-HCP Plan Area could result in **moderate beneficial impacts** to wildlife compared to No Action.	7,390 acres from land development activities within the SEP-HCP Plan Area could result in **minor beneficial impacts** to wildlife compared to No Action.	16,014 acres from land development activities within and adjacent to Bexar County could result in **moderate beneficial impacts** to wildlife compared to No Action.	43,741 acres from land development activities within the SEP-HCP Plan Area could result in **moderate beneficial impacts** to wildlife compared to No Action.
Golden-cheeked Warbler	Anticipated land development will result in the loss of approximately 51,150 acres of GCWA habitat within the SEP-HCP Plan Area. These adverse impacts may be mitigated through project-by-project take authorization by the Service and would contribute to species' recovery. However, many projects may continue, as they do now, with no take coverage for impacts to listed species resulting in **moderate adverse impacts**.	Potential adverse impacts to GCWA associated with land development activities are similar to the No Action Alternative. The conservation of approximately…			
		23,430 acres of GCWA habitat from land development activities within the SEP-HCP Plan Area could result in **moderate beneficial impacts** to the GCWA compared to No Action.	5,250 acres of GCWA habitat from land development activities within the SEP-HCP Plan Area could result in **minor beneficial impacts** to GCWA compared to No Action.	11,714 acres of GCWA habitat from land development activities within or adjacent to Bexar County could result in **minor to moderate beneficial impacts** to GCWA compared to No Action.	35,141 acres of GCWA habitat from land development activities within the SEP-HCP Plan Area could result in **moderate beneficial impacts** to GCWA compared to No Action.
Black-capped Vireo	Anticipated land development will result in the loss of approximately 10,084 acres of BCVI habitat	Potential adverse impacts to BCVI associated with land development activities and the potential beneficial impacts associated with conversion of forest to BCVI habitat are similar to the No Action Alternative. The conservation and management of approximately.			

Resource/ Topic	No Action	Proposed SEP-HCP	10% Participation	Single-County	Increased Mitigation
	within the SEP-HCP Plan Area. However, historic land cover change suggests that BCVI habitat will also be created. Adverse impacts will be mitigated through project-by-project take authorization by the Service. No Action could result in **negligible adverse and beneficial impacts**.	6,600 acres of BCVI habitat within the SEP-HCP Plan Area could result in **minor to moderate beneficial impacts** to the BCVI compared to No Action.	1,390 acres of BCVI habitat within the SEP-HCP Plan Area could result in **minor beneficial impacts** to the BCVI compared to No Action.	3,300 acres of BCVI habitat within or adjacent to Bexar County could result in **minor beneficial impacts** to the BCVI compared to No Action.	6,600 acres of BCVI habitat within the SEP-HCP Plan Area could result in **minor to moderate beneficial impacts** to the BCVI compared to No Action.
Covered Karst Invertebrates	Anticipated land development could result in the loss of approximately 105,431 acres in Karst Zone 1 through Zone 4 or 247 occupied karst features within the SEP-HCP Plan Area, which will result in adverse impacts. These adverse impacts may be mitigated through project-by-project take authorization by the Service and would contribute to species' recovery. However, many projects may continue, as they do now, with no take coverage for impacts to listed species resulting in **moderate adverse impacts**.	Potential adverse impacts to Covered Karst Invertebrates associated with land development activities are similar to the No Action Alternative. The conservation of approximately…			
		1,000 acres within the SEP-HCP Plan Area could result in **minor to moderate beneficial impacts** to the BCVI compared to No Action.	750 acres within the SEP-HCP Plan Area could result in **minor beneficial impacts** to the BCVI compared to No Action.	1,000 acres within the SEP-HCP Plan Area could result in **minor beneficial impacts** to the BCVI compared to No Action.	2,000 acres within the SEP-HCP Plan Area could result in **moderate beneficial impacts** to the BCVI compared to No Action.

Resource/ Topic	No Action	Proposed SEP-HCP	10% Participation	Single-County	Increased Mitigation
Socio-economic Resources	The No Action Alternative is not likely to substantially affect the projected population, employment or general economic trends and the tax base will continue to grow within the SEP-HCP Plan Area. Growth under the No Action Alternative would result in **negligible adverse impacts**.	Potential adverse impacts to the Socioeconomic Environment associated with land development activities are similar to the No Action Alternative. The conservation of approximately…			
		31,030 acres from land development activities within the SEP-HCP Plan Area could result in both beneficial and adverse impacts. The intensity of these impacts is anticipated be minimal. Compared to No Action, this alternative is likely to have **negligible adverse impacts**.	7,390 acres from land development activities within the SEP-HCP Plan Area could result in both beneficial and adverse impacts. The intensity of these impacts is anticipated to be minimal. Compared to No Action, this alternative is likely to have **negligible adverse impacts.**	16,014 acres from land development activities within the SEP-HCP Plan Area could result in both beneficial and adverse impacts. The intensity of these impacts is anticipated to be minimal. Compared to No Action, this alternative is likely to have **negligible adverse impacts.**	43,741 acres from land development activities within the SEP-HCP Plan Area could result in both beneficial and adverse impacts. The intensity of these impacts is anticipated to be minimal. Compared to No Action, this alternative is likely to have **minor adverse impacts.**
Climate Change	Anticipated land development will generally reduce open space, native vegetation communities, and increase heat island effects. Some adverse impacts may be moderated by existing regulations and through other park/open space initiatives as well as ESA take authorizations. Overall **minor adverse impacts** to the climate relative to the action alternatives.	Potential adverse impacts to the Climate Change associated with land development activities are similar to the No Action Alternative. The conservation of approximately…			
		31,030 acres from land development activities within the SEP-HCP Plan Area could result in **minor beneficial impacts** to climate compared to No Action.	7,390 acres from land development activities within the SEP-HCP Plan Area could result in **negligible beneficial impacts** to climate compared to No Action.	16,014 acres from land development activities within and adjacent to Bexar County could result in **minor beneficial impacts** to climate compared to No Action.	43,741 acres from land development activities within the SEP-HCP Plan Area could result in **moderate beneficial impacts** to climate compared to No Action.

Resource/ Topic	No Action	Proposed SEP-HCP	10% Participation	Single-County	Increased Mitigation

*Alternatives are discussed in Chapter 3 and analyzed with respect to the environment in Chapter 4. Negligible, minor and moderate impacts are defined under the Environmental Consequences Methodology sections within each resource in Chapter 4.

CHAPTER 1

INTRODUCTION, PURPOSE AND NEED

1.1 INTRODUCTION

Bexar County and the City of San Antonio (Applicants) are applying to the U. S. Fish and Wildlife Service (Service) for an incidental take permit (ITP) under section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (ESA), to authorize the incidental take of nine federally endangered species, two birds and seven karst invertebrates (collectively the Covered Species). The ESA protects threatened and endangered species and their habitats by prohibiting "take" of these species without a permit. As defined by the ESA, take means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." The U.S. Fish and Wildlife Service (Service) can permit the incidental take of endangered species for certain activities if certain permit issuance criteria are met, including prescribed measures to mitigate or minimize harm.

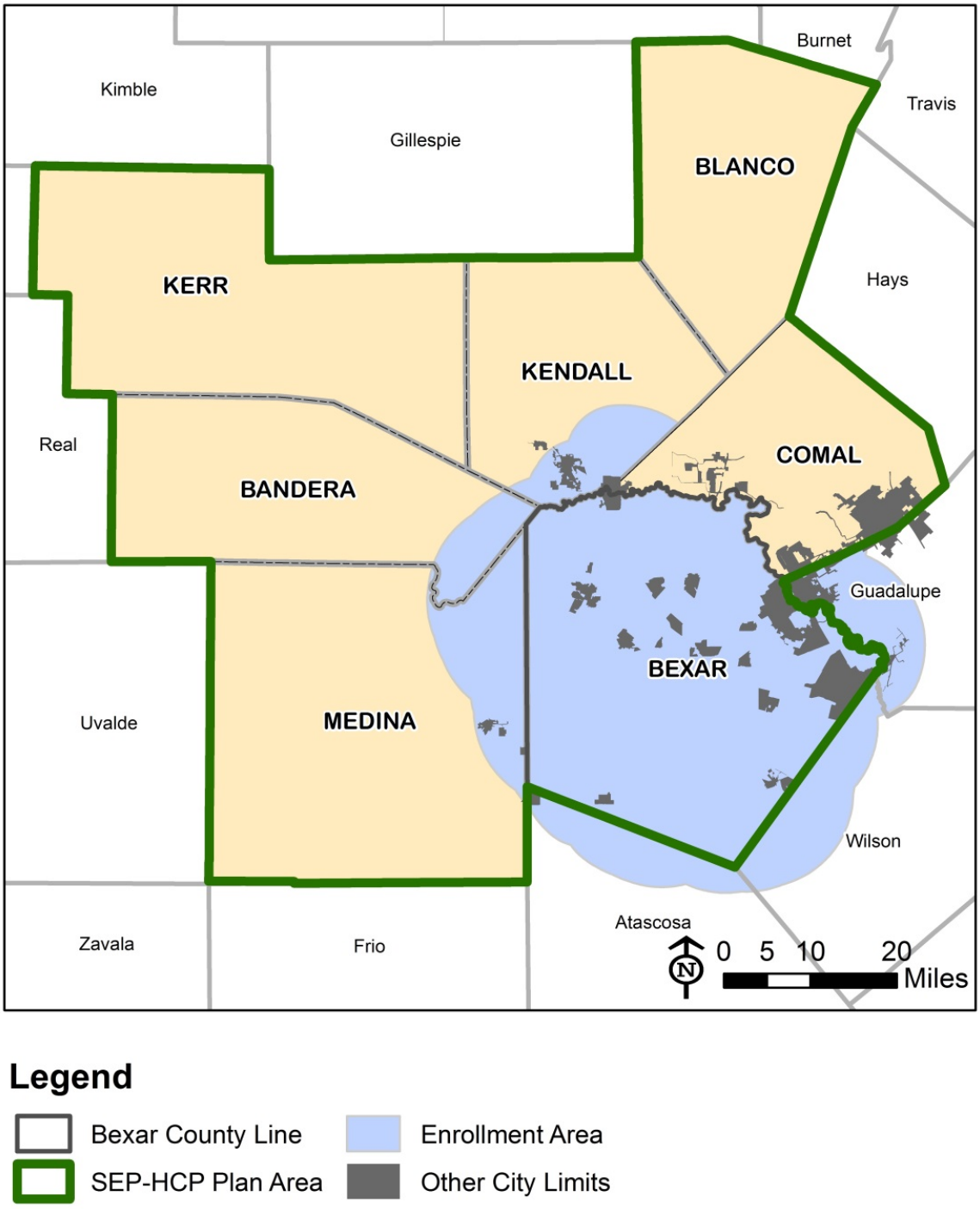
In support of the permit application the Applicants have prepared a habitat conservation plan called the Southern Edwards Plateau Habitat Conservation Plan (SEP-HCP) covering a 30-year period. If approved by the Service, the permit will authorize a limited amount of incidental take of Covered Species within the jurisdictions of Bexar County and the City of San Antonio. The SEP-HCP creates a voluntary, locally managed, and simplified process for complying with the ESA.

The issuance of an ITP by the Service is a federal action subject to the provisions of the National Environmental Policy Act of 1969 (NEPA; 42 USC 4321 et seq.). As part of the NEPA process, the Service prepared this Environmental Impact Statement (EIS) that analyzes the impacts of issuing an ITP to the Applicants including, among others, impacts to social, cultural and economic resources as well as natural resources.

1.1.1 SEP-HCP Plan Area and Enrollment Area

The SEP-HCP Plan Area (Plan Area) includes Bexar, Medina, Bandera, Kerr, Kendall, Blanco and Comal counties (**Figure 1-1)**. An activity that will incidentally take a Covered Species (Covered Activities) must occur within the Enrollment Area. The Enrollment Area is defined as the jurisdictions of Bexar County and the City of San Antonio, including both the current and future ETJ of the City of San Antonio but excluding any portion of Comal County to be able to utilize the SEP-HCP for ESA compliance for incidental take. Conservation actions may occur throughout all seven counties of the Plan Area. Comal County has developed an HCP to serve the needs of the county; therefore, incidental take within Comal County can be directed to the Comal County HCP, not the SEP-HCP.

Figure 1-1: SEP-HCP Plan Area and Enrollment Area



Source: SEP-HCP 2013.

The Natural Environment

The Plan Area is approximately 4,126,000 acres and crosses parts of six different ecological subregions, as described by the U.S. Environmental Protection Agency (EPA) including: Balcones Canyonlands, Edwards Plateau Woodlands, Northern Blackland Prairie, Northern Nueces Alluvial Plains, Southern Post Oak Savanna, and Llano Uplift. As such, the Plan Area has highly variable terrain ranging from gently undulating to rolling hills in the southeast to high topographic relief associated with incised

valleys in the northwest. The dominant vegetation cover in the Plan Area ranges from a combination of oak and juniper woodlands (McMahan *et al.* 1984) in the west to tall grass and short grass prairies in the eastern portion of the Plan Area (United States Department of Agriculture [USDA] 1962). Starting in the 1990s the forested land cover in the Plan Area began shrinking due to conversion to grassland/shrub vegetation and urban land uses. It is anticipated that almost 7,800 acres of natural vegetation will be converted to urban uses each year between 2010 and 2040.

The water resources within the Plan Area support a variety of wildlife and riparian habitat, and provide for recreational uses and scenic vistas. These resources include the Edwards and Trinity aquifers; several rivers including the Blanco, Guadalupe, Medina, San Antonio, and Pedernales; two major impoundments at Medina and Canyon lakes; and numerous streams, creeks, and springs, some of which have been designated as ecologically significant. The Plan Area provides habitat for approximately 520 wildlife species as well as 48 federally and/or state-listed threatened and endangered species. Approximately 134,800 acres or 3.3 percent of the Plan Area are currently under some degree of conservation, including lands owned by public entities or conservation organizations and private lands under conservation easements.

The Human Environment

The Plan Area is a growing region in Central Texas with a 2010 population of almost 2 million people; more than 86 percent live in the City of San Antonio and Bexar County (U.S. Census Bureau [USCB] 2010). The Plan Area is expected to continue to grow to more than 3.2 million people by 2040 with notable changes expected in Medina County (207 percent increase), Comal County (173 percent increase), and Kendall County (98 percent increase) (Environmental Systems Research Institute Business Analyst Online [ESRI BIS] 2009; Wendell Davis & Associates [WDA] 2010a). The dominant economic drivers within the Plan Area include education, health care, the leisure industries, and the financial and real estate industries. Joint Base San Antonio- Camp Bullis (Camp Bullis) is a 28,000-acre military base located in northern Bexar County. It is the largest military facility in the Plan Area. According to 2006 employment statistics, Camp Bullis was the largest generator of employment in the San Antonio metropolitan area, supporting the employment of 195,075 people including direct, indirect and induced jobs (City of San Antonio and United States Department of Defense [DOD] 2009). Because of these economic strengths, the region has fared generally well through the recent economic downturn. The education and health care sectors, in particular, have been forecasted to continue to lead the economic growth of the region; combined, these industries are forecasted to add over 67,000 new jobs to the region by 2018 (Texas Workforce Commission 2008). The rapidly growing human population and the vibrant and growing economy suggest a potential for losses or degradation of habitat for the region's endangered species as land is developed to support this growth. Of the total acres within the Plan Area, excluding Camp Bullis and the sectors within Bexar County that do contain potential habitat for the Covered Species, approximately 12 percent of the land was developed by 2009, with Bexar and Comal counties accounting for the largest percentage of development. By 2040 the amount of developed acreage is expected to increase in the Plan Area to 19 percent for a total of more than 240,000 acres (WDA 2010b).

1.1.2 Southern Edwards Plateau Habitat Conservation Plan (SEP-HCP)

The SEP-HCP seeks to balance the needs for future growth in the region and the conservation needs of endangered species and their habitat. It will provide an option that non-federal entities may voluntarily use to achieve compliance with the ESA in an expedited and efficient manner for, otherwise lawful, development activities. In support of the ITP application, the Applicants prepared the SEP-HCP to

establish a conservation program that will minimize and mitigate, to the maximum extent practicable, the impacts of incidental take of the Covered Species in the Plan Area that will be authorized by the proposed permit. In addition to the Covered Species, the SEP-HCP voluntarily addresses some of the conservation needs of several other species found in the Plan Area (Voluntarily Conserved Species, **Table 0-1**). The Voluntarily Conserved Species are expected to benefit from the conservation actions implemented for the Covered Species through the SEP-HCP. Voluntarily Conserved Species would not be covered by the ITP. If any are listed in the future, the ITP and its associated SEP-HCP will have to be amended to cover incidental take for those species.

Table 0-1: Covered and Voluntarily Conserved Species in the Plan Area

	Common Name	Scientific Name	Taxa	Habitat
COVERED SPECIES	Golden-cheeked warbler	*Dendroica chrysoparia*	Bird	Closed canopy juniper-oak woodlands
	Black-capped vireo	*Vireo atricapilla*	Bird	Deciduous shrub habitats
	Government Canyon Bat Cave spider	*Neoleptoneta microps*	Arachnid	Karst caves – known in Government Canyon State Natural Area
	Madla Cave meshweaver	*Cicurina madla*	Arachnid	Karst – known in 20 caves in Bexar County
	Bracken Cave meshweaver	*Cicurina venii*	Arachnid	Karst – known in 1 cave in Bexar County
	Government Canyon Bat Cave meshweaver	*Cicurina vespera*	Arachnid	Karst – known in 1 cave in Bexar County
	A beetle with no common name	*Rhadine exilis*	Insect	Karst – known in 45 to 50 caves in Bexar County
	A beetle with no common name	*Rhadine infernalis*	Insect	Karst – known in 36 to 39 caves in Bexar County
	Helotes mold beetle	*Batrisodes venyivi*	Insect	Karst – known in 8 caves in Bexar County
VOLUNTARILY CONSERVED SPECIES	Cave myotis bat	*Myotis velifer*	Mammal	Natural and manmade structures and limestone caves
	Cagle's map turtle	*Graptemys caglei*	Reptile	Riffles and pools of rivers and major streams
	Texas tortoise	*Gopherus berlandieri*	Reptile	Open scrub woods, arid brush, lomas, and grass-cactus associations
	Indigo snake	*Drymarchon corais*	Reptile	Mesquite-grassland-savannah near water source
	Spot-tailed earless lizard	*Holbrookia lacerate*	Reptile	Prairies, grasslands, savannas, and open woodlands
	Texas horned lizard	*Phrynosoma cornutum*	Reptile	Flat open terrain with sparse plant cover with sandy, rocky or loamy soils
	Texas garter snake	*Thamnophis sirtalis annectens*	Reptile	Adjacent to streams, rivers, ponds, lakes, and marshes
	Eurycea salamanders	Various	Amphibian	Aquatic karst, aquifers, and springs
	Golden orb	*Quadrula aurea*	Mollusk	Moderate-sized streams and small rivers
	Texas pimpleback	*Quadrula petrina*	Mollusk	Moderate-sized streams and small rivers
	Texas fatmucket	*Lampsilis bracteata*	Mollusk	Moderate-sized streams and small rivers
	Tobusch fishhook cactus	*Sclerocactus brevihamatus ssp. Tobuschii*	Plant	Juniper-Oak woodland

C	Common Name	Scientific Name	Taxa	Habitat
	Big red sage	*Salvia pentstemonoides*	Plant	Seeps and creeks within limestone canyons
	Bracted twistflower	*Strentanthus bracteatus*	Plant	Oak-juniper woodland
	Longstalk heimia	*Nesaea longipes*	Plant	Desert spring-runs, seepage slopes and near perennial streams
	Correll's false dragon-head	*Physostegia correlli*	Plant	Stream sides, creek beds, irrigation channels, and roadside ditches
	Canyon rattlesnake-root	*Prenanthes carrii*	Plant	Upper woodland canyon drainages and creek side seepage shelves

Source: SEP-HCP 2013.

1.2 PURPOSE AND NEED FOR ACTION

The Proposed Action under NEPA is the issuance of an ITP by the Service that will authorize incidental take of the Covered Species, as provided for under Section 10(a)(1)(B) of the ESA, associated with lawful activities. Issuance of this permit will also allow the Applicants to extend this authorization to other non-federal entities within the Enrollment Area and in accordance with the SEP-HCP. The purpose of issuing an ITP is to authorize the Applicants to "take" the Covered Species in the Enrollment Area while conserving their habitat. The need for issuing the permit is to conserve the covered species and the ecosystems upon which they depend and to ensure ESA compliance.

Several key goals and objectives have been identified through input from public and agency stakeholders in support of the purpose and need for the Proposed Action. The goals and objectives described below reflect the benefits that the Applicants and the stakeholder community expect to achieve as a result of issuing a permit.

1.2.1 Protect and Manage Habitat of Threatened and Endangered Species at a Regional Scale

Land development activities have accompanied and supported the population and economic growth in Bexar County and have resulted in the loss of habitat for federally threatened or endangered species within the Plan Area. Between 2010 and 2040, 341,551 new residential buildings (multi-family and single family) are projected to be built in the Plan Area. More than half of this development (55 percent) will occur in Bexar County (WDA 2010). Over 30 years, it is estimated that the Covered Species could lose almost 167,000 acres of habitat in the Plan Area of which most (68.7 percent) is predicted to occur in Bexar County (**Table 0-2**).

Table 0-2: Estimated Habitat Loss within the Plan Area (2010 to 2040)

County	Acres of Available Habitat	Estimated Acres of Habitat Loss	Share of Habitat Loss
Golden-cheeked Warbler Habitat			
Bandera	165,752	2,428	1.5%
Bexar	59,018	14,883	25.2%
Blanco	46,530	166	0.4%
Comal	115,808	23,163	20.0%
Kendall	65,269	3,413	5.2%
Kerr	113,985	1,565	1.4%
Medina	92,308	5,532	6.0%
SEP-HCP Plan Area	658,670	51,150	7.8%
Black-capped Vireo Habitat			
Bandera	7,599	133	1.8%
Bexar	17,856	5,073	28.4%
Blanco	2,275	7	0.3%
Comal	3,591	715	19.9%
Kendall	4,945	217	4.4%
Kerr	53,074	905	1.7%
Medina	62,292	3,034	4.9%
SEP-HCP Plan Area	151,632	10,084	6.7%
Karst Species Habitat – Karst Zones 1 & 2			
Bandera	0	0	0.0%
Bexar	109,793	46,276	42.1%
Blanco	0	0	0.0%
Comal	0	0	0.0%
Kendall	0	0	0.0%
Kerr	0	0	0.0%
Medina	20,161	4,895	24.3%
SEP-HCP Plan Area	129,954	51,171	39.4%
Karst Species Habitat – Karst Zones 3 & 4			
Bandera	444	40	9.0%
Bexar	131,209	48,296	36.8%
Blanco	0	0	0.0%
Comal	0	0	0.0%
Kendall	0	0	0.0%
Kerr	0	0	0.0%
Medina	24,358	5,923	24.3%
SEP-HCP Plan Area	156,011	54,259	34.8%

Source: SEP-HCP 2013.

The Service has identified habitat loss and degradation as one of the primary factors threatening the survival and recovery of these species. While recent conservation initiatives sponsored by the City of San Antonio, such as the Edwards Aquifer Protection Program, have protected tens of thousands of acres in the Plan Area from future development most of these actions do not specifically provide for the protection or management of the Covered Species habitats. Without specific habitat protection and on-

going management, the conservation value of these lands for the Covered Species may be limited. The region's few conservation actions that have specifically targeted the protection and management of endangered species are relatively small and scattered. Unfortunately, these isolated efforts may not provide for the self-sustaining ecosystem processes that naturally maintain endangered species habitats. One objective of the SEP-HCP is to design and implement a regional conservation program that focuses on protection and long-term management of endangered species habitat while supporting the conservation of other regionally important natural resources.

1.2.2 Expedite the Incidental Take Permitting Process

The process for obtaining an ITP from the Service can be expensive and could take years to complete. One of the benefits of the SEP-HCP is that it reduces the number of steps and time required to complete the individual permitting process. The SEP-HCP will provide a significant time savings for development projects in the Enrollment Area that require a permit (**Figure 1-2**).

Figure 1-2: Permitting Process – Without a HCP vs. With a HCP

Source: SEP-HCP EIS Team 2011.

1.2.3 Increase Compliance with ESA

As the population and employment in Bexar County continues to grow, land development will occur to accommodate this growth. The need for an ITP is based on the development expected to occur in the Enrollment Area that has the potential to result in take of the Covered Species. In applying for an ITP from the Service without the SEP-HCP, the developer is responsible for all legal and consultation fees, costs for scientific studies and environmental documentation, and the cost of implementing the agreed upon mitigation measures; these expenses can range from tens of thousands to hundreds of thousands of dollars. Some developers elect to proceed with projects without proper coordination with the Service and risk enforcement actions that could delay completion of their projects and/or result in fines or imprisonment. Non-compliance with ESA creates a situation where habitat is lost or degraded without the benefits of the corresponding conservation measures. A benefit of the expedited compliance process associated with the SEP-HCP is that it could encourage greater compliance with the ESA.

1.2.4 Address Compatibility Issues between the Mission of Camp Bullis and the Needs of Endangered Species

The DOD identified encroaching land development and conflicts with endangered species as significant compatibility issues threatening the training mission at Camp Bullis (Cannizzo 2011). To identify solutions, the City of San Antonio, Bexar County, and Camp Bullis prepared the *Camp Bullis Joint Land Use Study* (JLUS) with the input from local stakeholders to help ensure that economic growth and land development is managed in a manner that allows the installation to achieve its mission and remain a vital contributor to the region's economy. The JLUS recommended the implementation of a HCP to help alleviate endangered species-related compatibility issues (Matrix Design Group 2009).

1.2.5 Support Economic Growth

Out of concern that compliance with the ESA could adversely affect local economies, the State of Texas formed an "Interagency Task Force on Economic Growth and Endangered Species" (Task Force). The mission of this Task Force was to provide policy and technical assistance regarding compliance with endangered species laws and to provide recommendations to local and regional governments to help ensure compliance with endangered species laws and regulations in an effective and cost efficient manner. The Task Force identified HCPs as an innovative and important conservation tool for endangered species that could help alleviate potential conflicts with the economic growth of Texas communities (Task Force 2010).

1.2.6 Involve a Diversity of Stakeholders and Seek Partnerships

The Applicants emphasized the need to seek input and achieve support from a wide spectrum of stakeholders during development and implementation of the SEP-HCP. Some of the guiding principles used to involve a diversity of stakeholders and foster partnerships were:

1. Include a broad spectrum of stakeholder interests on advisory committees and teams.
2. Convene advisory groups after permit issuance to provide feedback on SEP-HCP implementation.
3. Enable and encourage formal, but flexible, partnerships with other jurisdictions to cooperate on SEP-HCP administration and implementation in regionally-appropriate ways.
4. Share research results, monitoring data, and other planning information with the public to the extent practicable without compromising sensitive biological, personal, or property information.

1.2.7 Implement a Locally-appropriate and Cost-effective Habitat Conservation Plan

According to stakeholder input, the regional conservation of threatened or endangered species should be achieved by using locally-appropriate and cost-effective tools and approaches. This includes understanding local community and landowner concerns regarding endangered species habitat protection and prioritizing the use of compatible land protection tools. There are several means to achieve this goal, including:

1. Seek voluntary, willing conservation partners for endangered species habitat protection and management.
2. Provide opportunities to review the progress of the conservation project and adapt it to changing needs and circumstances over time.
3. Minimize administrative costs associated with SEP-HCP implementation through the use of efficient and effective practices.

1.2.8 Leverage Existing Conservation Resources

Within the Plan Area there are several natural preserves, such as Texas Parks and Wildlife Department's (TPWD) Government Canyon State Natural Area, which provide habitat for endangered species, as well as established programs designed to conserve open space. One way to maximize the benefits of past, present, and future conservation efforts or opportunities is to coordinate the conservation efforts of the SEP-HCP within existing programs.

1. Coordinate conservation planning for endangered species on a regional scale to take advantage of available conservation opportunities.
2. Pool conservation resources from multiple sources, as available, to achieve biologically significant, regional conservation of endangered species.
3. Compliment other conservation efforts in the region (such as aquifer protection initiatives, scenic and cultural preservation, and parkland acquisition programs) and avoid competition with complementary programs for conservation resources.

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 the habitats upon which they depend. The implementing regulations for the ESA are presented in Title 50, section 17 of the Code of Federal Regulations (50 CFR § 17). Section 9 of the ESA prohibits "take" of any federally listed wildlife species (16 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)). Section 10(a)(1)(B) of the ESA authorizes the Service to issue an ITP for non-federal projects or activities not requiring federal authorization or funding. The permit allows for impacts to listed species, provided certain conditions are satisfied. These conditions include the preparation of a HCP outlining the measures that the recipient of the permit 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 applying for an individual ITP from the Service, a project sponsor is responsible for all legal and consultation fees, costs for scientific studies and environmental documentation, and the cost of implementing the agreed upon conservation measures.

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 designated critical habitat. The Service's issuance of an ITP is an action subject to the provisions of section 7 the ESA and therefore the Service must consult to determine whether issuance of the permit will jeopardize the continued existence of the listed species to be taken or result in the adverse modification of those species' designated critical habitats. Section 7 requires, among other things, an analysis of direct, indirect and cumulative effects on the listed species, effects on other listed species, including federally listed plants, and effects on designated critical habitat. The results of the section 7 consultation are documented in a Biological Opinion prepared by the Service. The intra-service section 7 consultation must be concluded prior to the issuance of the ITP.

1.3.2 National Environmental Policy Act (NEPA)

The issuance of an ITP is a federal action and is therefore subject to NEPA. NEPA requires that federal agencies consider all reasonably foreseeable environmental impacts of their proposed actions on the human and natural 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 the ESA lays out substantive requirement for compliance, NEPA sets out procedures for agencies to consider the impacts of their actions, so the scope of NEPA goes beyond that of the ESA. NEPA analyses must consider the impacts of a federal action on the human environment, such as cultural (archeological and historical), social, and economic resources, as well as the natural environment. With respect to HCPs in general, compliance with NEPA is not a direct obligation or requirement of the Applicant for the ITP. 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 ITP can be issued.

The CEQ identifies three levels of environmental review in decision-making for agency actions. Routine actions which normally do not have adverse environmental impacts may be classified as Categorical Exclusions. Agencies may prepare an Environmental Assessment in order to determine whether or not an action may have significant impacts, and if so then prepare an EIS, or it may prepare an EIS, if significant impacts are anticipated. The severity of impacts can be subjective, and may depend on public perception and controversy. The Service has determined that an EIS is appropriate for this proposed action. The final step in the EIS process is a Record of Decision (ROD).

1.3.3 Texas State Law Relevant to Regional Habitat Conservation Plans

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

Under Chapter 83 of the Texas Parks and Wildlife Code, governmental entities participating in a 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 HCP for which the governmental entity was issued a federal permit (§ 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 an HCP (§ 83.014(b)).
- Limiting water or wastewater service to land that has been designated as habitat preserve (§ 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 (§ 83.014(d)).

In addition to the above prohibitions, Chapter 83 stipulates that the mitigation included in an 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 HCP will protect. However, after notice and hearing, an 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 HCP (§ 83.105).
Chapter 83 also stipulates that governmental entities participating in an 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 (§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 HCP is implemented.

Finally, Chapter 83 imposes a requirement that before adopting an HCP, amendment, ordinance, budget, fee schedule, rule, regulation, or order with respect to an HCP, the Applicants must hold a public hearing and publish notice of such hearing in the newspaper of largest general circulation in the counties in which the Applicants proposes the action. Such notice must include a brief description of the proposed action and the time and place of the public hearing on the proposed action. The Applicants must publish notice in accordance with the foregoing requirements, and must do so not later than the thirtieth day prior to the public hearing (§83.019).

1.4 DECISION NEEDED

The Service will determine whether to issue an ITP to the Applicants authorizing take of the Covered Species and the implementation of the SEP-HCP.

CHAPTER 2

SCOPING AND PUBLIC PARTICIPATION

2.1 SCOPING

In accordance with NEPA agencies preparing an EIS shall conduct scoping as an early and open process to determine the range of issues to be addressed and to identify the significant issues related to the proposed action. As part of the scoping process, the Service invites the participation of affected federal, state, and local agencies; any affected Indian tribe; the proponent of the action; and other interested parties including those who might not be in accord with the action. NEPA requires a specific process for scoping that includes the publication of a Notice of Intent (NOI) in the *Federal Register*, a scoping meeting, and a comment period.

2.1.1 Notice of Intent

An NOI was published in the *Federal Register* on Wednesday, April 27, 2011. The Service issued this notice to advise the public that an EIS will be prepared for the SEP-HCP. A copy is posted to the SEP-HCP website (www.sephcp.com) and included in **Appendix A**.

2.1.2 Public Scoping Meetings

Five public scoping meetings were held throughout the Plan Area between June 6, 2011 and June 14, 2011 to engage the community, share information and ask the community for their input (**Table 0-1**). The meetings provided opportunities for the public to learn about and comment on the EIS as it was being developed.

Kerrville, TX – June 13, 2011

Photo Credit: SEP-HCP EIS Team 2011.

Table 0-1: Dates and Locations of Public Scooping Meetings

Date	City	Location
June 6, 2011	Bandera, TX	Silver Sage Corral Great Room, 803 Buck Creek Drive
June 7, 2011	Boerne, TX	Boerne Convention Center, 820 Adler Road
June 9, 2011	Blanco, TX	Old Blanco County Courthouse, 300 Main Street
June 13, 2011	Kerrville, TX	YO Ranch Conference Center, 2033 Sidney Baker
June 14, 2011	Helotes, TX	Helotes Ag Activity Center, 12132 Leslie Road

Source: SEP-HCP EIS Team 2011.

Outreach

Meeting announcements were published in the Blanco County News, Helotes Echo, Kerrville Daily Times, Bandera Bulletin, San Antonio Express News, La Prensa (Spanish), Hondo Anvil Herald and Boerne Star. These announcements were published the week of May 16, 2011, the week of May 30, 2011, and again the week of June 6, 2011. Meeting details were also posted to several websites

including the SEP-HCP project website and websites managed by the Service, the Hill Country Alliance, and the Texas Water Development Board.

Members of the CAC, BAT, and the AOG were also sent invitations to the public scoping meetings. These notifications served and an invitation to interested stakeholders to become involved in the scoping process for the EIS. All meeting announcements are included in **Appendix B** and Scoping Meeting materials can be found in **Appendix C**.

Helotes, TX – June 14, 2011

Photo Credit: SEP-HCP EIS Team 2011.

Attendance

A total of 211 people attended the five public scoping meetings including 194 members of the public, 3 media outlets, and 14 elected officials (**Table 0-2**).

Table 0-2: Attendance

Location	Public	Media	Public Officials	Total
Bandera – Silver Sage Corral Great Room	10	0	3	13
Boerne – Boerne Convention Center	44	3	5	52
Blanco – Old Blanco County Courthouse	25	0	1	26
Kerrville – YO Ranch Conference Center	95	0	4	99
Helotes – Helotes AG Activity Center	20	0	1	21
TOTAL	194	3	14	211

Source: SEP-HCP EIS Team 2011.

2.1.3 Scoping Comments

Sixty-six comments were received within the scoping period from April 27 to July 26, 2011. Comments were submitted via email, the U.S. Postal Service mail, fax, comment card, and verbally to the court reporter at the meetings. The following summarizes the topics discussed during the scoping process.

What is an HCP? How will it work? Discuss the administration, enforcement, and impacts of an HCP on property owners, non-applicant counties, and developers.

HCPs must accompany an ITP application and are developed and administered by the Applicants for ESA ITPs. HCPs ensure that the effects of authorized take are adequately minimized and mitigated. HCPs must include: (1) an assessment of the impact that will likely result from the taking; (2) measures the Applicants will take to minimize and mitigate the impacts and the funding available to implement those measures; (3) alternative actions to the taking that were considered and the reasons the alternatives were not chosen; and (4) other measures that the Service may require as necessary or appropriate for purposes of the conservation plan.

The mitigation measures included in an HCP reduce or address the potential adverse effects of a proposed activity on a species covered by the HCP. Mitigation and/or minimization measures may include (but are not limited to) conservation of habitat, creation of new habitat, establishing buffers

around existing habitat, modification of land use practices or project design, and restrictions on access to habitat areas.

The ESA is enforced by the Service. The HCP sets the terms and conditions, as described above, for species conservation under the section 10(a)(1)(B) permit. Failure to comply with the permit can lead to suspension or termination of the permit.

The effects of the SEP-HCP on property owners who would like to sell easements or outright sell land to the SEP-HCP would be payment, according to the terms of the real estate deal they make with the SEP-HCP administrator. Adjacent land owners would only be affected by the fact that the land under the SEP-HCP administration would not be developed.

What are the benefits of having an HCP for Bexar County, non-applicant counties, developers, and property owners?

Camp Bullis believes that GCWA are being displaced onto their military installations (Cannizzo 2011). With the perceived threat of losing Camp Bullis, endangered species conservation in south central Texas has become a priority and has spurred Bexar County and the City of San Antonio to seek ways of supporting ESA compliance and protecting the area's endangered species. Compliance with the ESA requires authorization from the Service to "take" a listed species, and also requires appropriate mitigation (such as protecting nearby habitat) to offset any adverse impacts to the species. Having a streamlined means of complying with the ESA, as has been the case in Travis County (Balcones Canyonlands Conservation Plan) since 1996, would result in a much quicker and more efficient way for property owners and developers to comply with the ESA, while also focusing conservation efforts. The SEP-HCP would:

- Create a new, voluntary, streamlined process for ESA compliance that may be used for a variety of non-federal projects;
- Result in a locally-created solution to endangered species issues that incorporates stakeholder concerns and gives long-term ESA permitting assurances to the public and private-sector participants;
- Promote the recovery of the area's endangered and threatened species by creating a regional preserve system for the GCWA, BCVI, and Covered Karst Invertebrates and providing for the perpetual management and monitoring of these preserve lands for the benefit of the species;
- Reduce the time associated with obtaining incidental take authorization under the ESA, particularly with respect to developing individual HCPs, waiting for applications to be processed by the Service, and obtaining appropriate mitigation for project impacts;
- Result in a cost effective means by which to ensure economic growth and development unhindered by the presence of species listed under ESA.

The SEP-HCP's long-term focus over a regional scale would take better advantage of conservation opportunities in a rapidly changing landscape than smaller, individual conservation efforts. The long-term protection and management of natural resources across multiple counties will also contribute to the general health of the region's Hill Country ecosystems, including wildlife, woodlands, and water resources.

Who is asking for the HCP, why do they want it, and how was the Plan Area defined? What species will be covered in the SEP-HCP and why? Is the Texas General Land Office involved?
The Applicants have begun a regional planning effort to balance the conservation needs with the demand for economic growth and development. The SEP-HCP would allow the County and City to obtain a permit from the Service that would establish a locally-controlled, simplified process for complying with the ESA. The SEP-HCP would also create a coordinated regional conservation program to protect endangered species habitat in the Plan Area. The biological advisory team (BAT) for the SEP-HCP is responsible for advising the Applicants, on technical matters relating to the biology and conservation of the species and habitats addressed in the SEP-HCP. The BAT recommended the Plan Area boundaries at its February 8, 2010 meeting. Factors such as habitat and species distribution, vegetation, ecological shifts, land use patterns and trends, and the types of impacts anticipated in different areas were used to define the boundaries. County boundaries were used as a means to clearly define the boundary of the Plan Area. The Plan Area was delineated so that potential preserve land will be close to the location where incidental take will occur.

South central Texas is rich with a wide variety of natural resources that help define the region's unique character, such as dramatic vistas, endemic wildlife, deep caves, productive aquifers, and flowing waters. Some of these resources are also locally, regionally, or globally rare and sensitive to the effects of human activities. Endangered or threatened wildlife are often particularly sensitive to our use of the landscape. The SEP-HCP would authorize the incidental take in the Enrollment Area of the following Covered Species:

- **Golden-cheeked Warbler (*Setophaga [=Dendroica] chrysoparia*, GCWA)** - An endangered migratory songbird that nests in mature, dense juniper-oak woodland. This bird is primarily threatened with the loss or degradation of its habitat by a variety of land development activities. More information about the GCWA can be found in the SEP-HCP.
- **Black-capped Vireo (*Vireo atricapillus*, BCVI)** - A threatened migratory songbird that nests in open oak shrublands. This species is threatened by several factors including habitat conversion, overgrazing, and brood parasitism. More information about the BCVI can be found in the SEP-HCP.
- ***Rhadine exilis*** - An unnamed karst-dwelling beetle that is currently known from 45 to 50 caves in Bexar County.
- ***Rhadine infernalis*** - An unnamed karst-dwelling beetle that is currently known from 36 to 39 caves in Bexar County.
- **Helotes mold beetle (*Batrisodes venyivi*)** - A karst-dwelling beetle that is currently known from known from eight caves in Bexar County.
- **Government Canyon Bat Cave spider (*Neoleptoneta microps*)** - A karst-dwelling spider that is currently known from only two caves in Government Canyon State Natural Area.
- **Madla Cave meshweaver (*Cicurina madla*)** - A karst-dwelling spider that is currently known from several locations in Bexar County.
- **Bracken Cave meshweaver (*Cicurina venii*)** - A karst-dwelling spider that is currently known only by a single specimen from one locality in Bexar County.
- **Government Canyon Bat Cave meshweaver (*Cicurina vespera*)** - A karst-dwelling spider that is currently known only from one cave in Bexar County.

The karst invertebrates listed above each live entirely underground in the limestone caves and passages of the karst geologic formations that underlie much of south central Texas. These species are threatened

by habitat loss associated with filling or collapsing of caves, alternation of natural drainage patterns and surface plant and animal communities, contamination of groundwater, and quarry or mining operations. In June 2011, letters were sent to federal, state (including the General Land Office) and local agencies with the NOI to prepare an EIS and requesting comment on the potential resources that could be affected or issues that could arise by the issuance of an ITP under ESA.

How will the program be funded?
The ESA requires that an HCP identify and assure that funding will be available to properly implement the conservation program. The total cost to implement each alternative is estimated assuming, over 30 years, that the SEP-HCP is fully implemented at an even rate and costs inflate by 3 percent per year. A portion of the total cost will be used to purchase the preserve system and a portion will be used for the management and monitoring of the preserve system (including the creation of a non-wasting management endowment). Participation fees and other investment revenues will cover a share of the total costs; however, public revenues will be needed to fully fund the SEP-HCP. The Applicants will seek other sources of non-assured funding to help reduce public costs, such as grant funding or cost-sharing with other entities or programs with similar conservation goals (see **Chapter 3 – Alternatives)**.

What restrictions will be placed on my property and water rights if I sell a conservation easement to the SEP-HCP preserve system?
The exact nature of the conservation easement will be negotiated on a case-by-case basis. Conservation easements are negotiated real estate contracts. They may include seasonal clearing and construction restrictions to minimize impacts to the GCWA and the BCVI during breeding seasons (between March 1 through July 31 for GCWA and, between March 15 and August 31 for BCVI).

Property owners that choose to negotiate a conservation easement on their land for the SEP-HCP preserve system would be required to follow the Texas Forest Service or professional arborist's guidelines for the prevention of oak wilt when clearing or trimming trees.

With regards to the protection of karst species, property owners may be asked to adhere to special conditions which could include measures requiring the investigation of accidentally discovered voids for the presence of listed species, additional consultation with the Service if the very rare karst species are encountered, and implementation of best practices to minimize impacts to species-occupied caves. After selling a conservation easement, the land owner retains all other rights of ownership, which may include water rights, using the land for agriculture, preventing trespass or selling or transferring the land to others.

How will public comments be incorporated and addressed in the EIS? How will comments from the county governments choosing to opt out be handled?
All public comments received during the comment period defined in the NOI (April 27, 2011 through July 26, 2011) were considered during the preparation of the EIS including the alternatives considered the identification of potential impacts.

Several counties, including Bandera, Blanco, Medina, Kendall and Kerr counties passed resolutions voicing concern about the SEP-HCP and requesting to be removed from the Plan Area. The Service mailed formal responses to these jurisdictions on November 1, 2011. Here is a summary from these letters:

The Service understands that Bandera County, Blanco County, Medina County, Kendall County, and Kerr County do not wish to be included in the planning process for the SEP-HCP. Based on this desire the SEP-HCP will cover incidental take of endangered species in Bexar County and the City of San Antonio (current and future ETJ) only, although conservation activities could occur in Bandera, Blanco, Medina, Kendall, Comal, Kerr, and Bexar counties. The acquisition of preserve land would only occur through private land transactions for conservation easements, Preservation Credits, and possibly fee title real estate transactions with willing landowners. This will provide willing landowners with financial benefits for maintaining habitat for listed species on their private lands.

In December 2011, Bexar County submitted an application to the Service for an ITP for the proposed SEP-HCP.

How were the Community Advisory Committee (CAC), Biological Advisory Team (BAT) and Agency Oversight Group (AOG) selected? What are their roles? And what actions have the taken?
The CAC was appointed to assist with development of the SEP-HCP, including reviewing the work of the BAT and the form and level of mitigation proposed in the SEP-HCP, identifying appropriate funding mechanisms to implement the SEP-HCP, and determining the method of participation in the SEP-HCP. The CAC has adopted a charge and a set of operational rules to guide their actions. The CAC was assembled with recommendations by stakeholders groups, Bexar County, the City of San Antonio, the Service, and TPWD, and includes 21 members representing a variety of interests.

To ensure that the process is consistent with Chapter 83 of the Texas Parks & Wildlife Code, which regulates the development of HCPs by local governments, at least 4 individuals or 33 percent of the CAC members (whichever is greater) own undeveloped or agricultural land in the Plan Area. TPWD also appointed one member of the CAC. The CAC met 21 times between January 2010 and July 2011 (**Table 0-3**). This group may be convened in future, if the SEP-HCP is implemented, and as needed.

Table 0-3: CAC Meetings

Meeting Date	Key Topics Discussed
January 19, 2010	• Process for electing a CAC chairperson • Rules of order and expectations • Background and work plan for the SEP-HCP • SEP-HCP participants roles, and responsibilities • Defining major framing issues for the direction of the SEP-HCP • Appointing a BAT member
February 18, 2010	• Texas Open Meetings Act and Public Information Act requirements • Process for adopting meeting operational procedures and a committee charge • Electing a chairperson • Comal County's experience with HCPs • Defining a Plan Area
March 1, 2010	• Texas Open Meetings Act • Adopting meeting operational procedures and committee charge • Coordination with Comal County • BAT recommendation for species to address in SEP-HCP

Meeting Date	Key Topics Discussed
April 5, 2010	• Camp Bullis Mission • Basic biology for the GCWA and BCVI • Inclusion of aquatic species
May 3, 2010	• Edwards Aquifer Recovery Implementation Program (ERIP) • Alternatives for Covered Species
June 7, 2010	• CAC sub-groups • HCP process • Karst species • Aquatic species • Alternatives for Covered Species • Permit duration
July 12, 2010	• Permit duration • General conservation strategy • Funding sources
August 2, 2010	• Permit holder • Conservation strategy, goals and objectives • Resource and impact assessments
September 13, 2010	• Human population and land use projections in the Plan Area • Projected habitat loss for the GCWA and BCVI • Conservation strategy, goals and objectives
October 4, 2010	• Permit holder • Population and land use • Habitat loss and mitigation strategy • Conservation measures • Participation process • Funding strategy
October 18, 2010	• GCWA and BCVI preserve size, preserve configuration, mitigation ratios and incidental take authorization
November 15, 2010	• BAT recommendations for the GCWA and karst conservation programs • Kerr County Commissioners Court presentation
December 6, 2010	• Designated Plan Area and options to modify • BAT recommendation for BCVI • Preliminary cost estimates for BAT recommended conservation measures • BAT recommendations for GCWA and karst species • Project schedule
January 4, 2011	• Basic concepts for SEP-HCP implementation and participation • Alternatives for conservation program structure and funding
February 7, 2011	• SEP-HCP draft brochure • NEPA scoping • CAC sub-group work sessions for conservation programs and funding
February 21, 2011	• Update from TPWD • CAC sub-group work sessions for the GCWA and BCVI conservation program
March 7, 2011	• Alternative GCWA and BCVI conservation program scenarios

Meeting Date	Key Topics Discussed
April 11, 2011	• Review CAC charge and operational procedures • Draft SEP-HCP • TPWD and Service presentations
May 9, 2011	• Another perspective on mitigation scenarios • Project schedule and CAC decision making process • Selection of preferred CAC alternative • Revised SEP-HCP brochure
June 15 & 16, 2011	• Development of a CAC recommended alternative
July 11, 2011	• CAC recommendations to Bexar County • Project schedule and future role of CAC

Source: SEP-HCP EIS Team 2011.

The BAT advises the CAC on scientific matters relating to the biology, conservation, and habitats of the species addressed in the SEP-HCP. The BAT will assist with calculating the degree of harm to the species covered by the SEP-HCP and calculating the size and configuration of the needed habitat preserves. Members of the BAT were appointed by the Bexar County, City of San Antonio, the Service, TPWD, and the landowner members of the CAC. The BAT met 19 times between January 2010 and June 2011 (**Table 0-4**). This group may be convened in future, if the SEP-HCP is implemented, and as needed.

Table 0-4: BAT Meetings

Meeting Date	Key Topics Discussed
January 29, 2010	• Overview of HCP and responsibilities of BAT • Project Timeline • Texas Open Meetings Act and Public Information Act requirements • Process for adopting meeting operational procedures • BAT charge • Recommendations for species to be covered and Plan Area
February 8, 2010	• BAT charge • Meeting operational procedures • Recommendations for Plan Area boundaries • Recommendations for species to be covered and Plan Area
February 22, 2010	• Meeting operational procedures • Recommendation on categories for addressing species • Recommendations for species to be covered and Plan Area
May 28, 2010	• Preliminary results of aquatic species research • Resource assessment reports • Covered activities, permit applicants, permit duration • Open Meetings Act training
June 18, 2010	• CAC Update • Resource Assessment Reports • Permit Duration • Conservation strategies, goals and objectives • Preserve size and strategies

Meeting Date	Key Topics Discussed
July 7, 2010	• Resource Assessment Reports • Conservation strategies, goals and objectives • Preserve size and strategies • Management and monitoring • Public access
July 28, 2010	• Conservation strategies, goals and objectives • Preserve size and strategies • Management and monitoring
August 25, 2010	• Management and monitoring • Mitigation ratios • Participation process
September 10, 2010	• Mitigation considerations • Human dimensions and impact analysis • Preserve size and configuration
September 24, 2010	• Preserve size and configuration • Karst minimum preserve standards • Karst habitat information and terminology • Karst conservation measures • Karst impact analysis
October 8, 2010	• Public access and HCPs • Public recreation in environmentally sensitive areas • CAC update • Take request, preserve size and spatial configuration for GCWA • GCWA and BCVI mitigation ratios • Karst mitigation and preserve standards
October 20, 2010	• Funding issues • GCWA mitigation and preserve standards: take request, preserve sizes and spatial configuration • Method to estimate currently available GCWA habitat • Karst mitigation and preserve standards
November 4, 2010	• GCWA mitigation and preserve standards • Karst mitigation and preserve standards
November 17, 2010	• CAC update • Karst mitigation and preserve standards • GCWA and BCVI mitigation and preserve standards • Public access and recreation standards
February 11, 2011	• GCWA habitat mapping • CAC questions and BAT response • Rural community response to SEP-HCP • Management and monitoring
March 11, 2011	• CAC questions and BAT response
April 1, 2011	• Public access on fee-simple land acquisitions • Category 3-5 species lists • BAT review of Draft SEP-HCP
June 6, 2011	• Service and City of San Antonio reorganization • BAT comment summary • Preparation of formal comments on Draft SEP-HCP

Meeting Date	Key Topics Discussed
June 10, 2011	• BAT comment summary • Formal comments and recommendation for Draft SEP-HCP

Source: SEP-HCP EIS Team 2011.

The AOG is a seven member group composed of representatives from Bexar County, the City of San Antonio, TPWD, the Service, and the co-chairs of the CAC. The role of the AOG is to review the progress of the project and ensure that work is completed on schedule and within budget. They are also charged with being the liaison between the Applicants and the state and federal regulatory agencies involved in the project. The AOG meets as needed throughout project development.

Was this SEP-HCP devised to benefit Camp Bullis and if so, why not mitigate around the base?
The US Army/Camp Bullis is not the permit applicant – the Applicants were part of a cooperative effort to produce the *Camp Bullis Joint Land Use Study* which revealed the need to address the conflicts that exist between the mission of Camp Bullis and development activities occurring around the base, and the needs of endangered species. One of the goals proposed in the SEP-HCP is to help address these conflicts. Implementation of the SEP-HCP could benefit Camp Bullis however it is not the primary purpose of the permit request. If land around Camp Bullis provides habitat for the Covered Species and if the land owners voluntarily wish to sell their land or an easement on their land for conservation purposes, then land around Camp Bullis may serve as preserve land. The SEP-HCP must be economically viable to be successful; a balance must be created between conservation and the economy.

Why not just shorten the permitting process?
A non-federal entity may choose to apply for an individual ITP when activities will result in harm to, or take of threatened or endangered species that is incidental to, and not the purpose of, the proposed activities. The permit serves as a tool to balance the protection needs of federally listed threatened and endangered species, and the desire of non-federal entities to develop or change the landscape. The steps involved in the permitting process are required to ensure that the effects of the authorized incidental take are adequately minimized and mitigated. Much of the permitting process involves a non-federal entity. The process includes putting together the appropriate documentation required for an application, such as the development of a HCP, and the NEPA process. Once the proper documentation is prepared for review and the developer and Service have agreed upon the best mitigation option, it is incumbent upon the developer to fulfill the mitigation requirements. While several of these steps have set time requirements, it is largely up to the developer to manage the schedule of the HCP development.

Can the SEP-HCP and the ITP be considered a "land grab" or can it be used to take private property?
If an ITP is issued by the Service, it would authorize the "take" of the endangered species covered in the SEP-HCP. The Applicants do not have the authority to take land or use eminent domain authority to acquire preserve land for the SEP-HCP. The SEP-HCP is voluntary; the Applicants will only enter into a negotiation to buy an easement or buy land from property owners in the Plan Area that have voluntarily requested participation.

What happens to the SEP-HCP if you do not get enough voluntary participants?
The SEP-HCP was designed to be flexible and responsive to the level of voluntary participation. While the ITP would authorize a maximum level of take, participants will only be able to use the SEP-HCP provided that a sufficient amount preserve land, based on the mitigation measures established in the SEP-HCP, is protected by the SEP-HCP.

How does the ESA work and how does it currently apply to property owners?
Non-federal entities whose otherwise lawful activities will result in the incidental take of a listed species may choose to apply for an individual permit. The Service can help determine whether a proposed project or action is likely to result in "take" and whether a HCP is recommended. Service staff can also provide technical assistance to help design a project to avoid take.

Why is it important to devise a streamlined process for compliance with the regulation? Will the SEP-HCP impose new regulations or restrictions on property owners?
The SEP-HCP does not impose any new rules or restrictions on property owners, unless they choose to sell a conservation easement to the Applicants.

Why are counties being included in the SEP-HCP that had already expressed a desire to be excluded?
The counties that opted out are not applicants in the plan and do not have an option to use the plan for incidental take coverage but they are included in the Plan Area. The Plan Area contains suitable habitat where an individual landowner can voluntarily choose to sell land or sell an easement for the SEP-HCP preserve system. The Applicants have no authority to tell landowners in the Plan Area to whom they can sell land.

Was a new alternative developed that considers the requests that some counties be excluded from the SEP-HCP?
The Single-County Alternative was developed which excludes those counties that requested to be excluded from the SEP-HCP. The Enrollment Area for the Single-County Alternative only includes those jurisdictions of the Applicants. The Plan Area of the Single-County Alternative is distinct from the other Action Alternatives as it would be limited to Bexar County and up to 10 miles outside of Bexar County.

Some stakeholders feel that the SEP-HCP and corresponding incidental take permit is an inappropriate intrusion on property owner rights.
A HCP, such as the SEP-HCP, is strictly a voluntary program. If a non-federal entity chooses to apply for an individual ITP for activities that will result in harm to threatened or endangered species, developers and other private and public entities within the Enrollment Area may forgo the preparation of individual plans for each action and voluntarily participate in the SEP-HCP. The plan does not intrude on private property; however, it gives a private property owner within the Plan Area an option to participate, if they want to participate, by offering to sell land or provide an easement for conservation.

Some stakeholders expressed a desire to protect the endangered species identified as they feel these species serve as an indicator of the environment's health and ability to support life.
The conservation of threatened and endangered species and their habitat is the purpose of the ESA.

2.1.4 Agency Scoping Process

In June 2011, letters were sent to federal, state and local agencies with the NOI attached requesting comments no later than August 22, 2011, on the potential resources that could be affected or issues that could arise by the issuance of the permit. The letter is included in **Appendix E**. The following agencies received a copy of this letter.

- Bexar Metropolitan Water District
- Edwards Aquifer Authority
- Federal Emergency Management

- Federal Highway Administration
- General Services Administration
- Guadalupe-Blanco River Authority
- Railroad Commission of Texas
- San Antonio Water Systems
- Texas Attorney General's Office
- Texas Commission on Environmental. Quality
- Texas Department of Agriculture
- Texas Department of Transportation
- Texas Division of Emergency Management
- Texas General Land Office
- Texas Parks and Wildlife Department
- Texas State Soil and Water Conservation Board
- Texas Water Development Board
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture – Natural Resources Conservation Service
- U.S. Department of Housing & Urban Development
- U.S. Department of the Air Force – Randolph Fir Force Base
- U.S. Department of the Army - Fort Sam Houston
- U.S. Environmental Protection Agency
- U.S. Geological Survey

2.1.5 SEP-HCP Website

The SEP-HCP website, www.sephcp.com, is the repository of all information concerning the development and activities involved in the SEP-HCP project and the NEPA process. Documents, such as the draft SEP-HCP, technical reports, maps, public notices, project management and guidance documents, press and media coverage and other links are included, in addition to a calendar of events, details about the project committees, and a page with project contact information and a place to leave a comment. The dedicated EIS page includes all materials presented during the public scoping meetings such as the NOI, meeting handouts, presentation slides, the comment card and information about how to submit a comment to the Service regarding the NEPA effort.

2.2 RECIPIENTS

Copies of the EIS are available at the SEP-HCP website (www.sephcp.com). Alternatively, you can request a CD including an electronic copy of the EIS by writing Adam Zerrenner, Field Supervisor, U.S. Fish and Wildlife Service, 10711 Burnet Road, Suite 200, Austin, TX 78758 or calling (512) 490-0057; or faxing (512) 490-0974. Printed copies of the EIS are also available for public review at the following locations:

Bandera County Library
505 Main Street
Bandera, TX 78003

San Antonio Central Library
600 Soledad
San Antonio, TX 78205

Blanco Library
1118 Main Street
Blanco, TX 78606

Boerne Public Library
210 North Main Street
Boerne, TX 78006

Kerr Regional History Center
425 Water Street
Kerrville, TX 78028

Hondo Public Library
1011 19th Street
Hondo, TX 78861

Electronic files of the DEIS were made available to the following federal, state, and local agencies and officials:

- Bexar County
- Bandera County
- Comal County
- Edwards Aquifer Authority, Environmental Studies
- Edwards Aquifer Research and Data Center, Texas State University
- Guadalupe-Blanco River Authority
- Kendall County
- Kerr County
- Medina County
- National Park Service, Santa Fe, New Mexico
- Texas Commission on Environmental Quality
- San Antonio River Authority
- Texas Department of Agriculture
- Texas Department of Transportation
- Texas General Land Office
- Texas Parks and Wildlife Department
- Texas Water Development Board
- Texas Department of Water Resources
- Texas State University, Texas Rivers Center, River Systems Institute
- U.S. Army Corps of Engineers, Fort Worth, Texas
- U.S. Bureau of Reclamation, Austin, Texas
- U.S. Department of Agriculture
- Natural Resources Conservation Service, Temple, Texas
- Rural Utilities Service (RUS), Washington, D.C.
- U.S. Environmental Protection Agency, Region 6, Dallas, Texas
- U.S. Farmers Home Administration, Temple, Texas
- U.S. Geological Survey, Austin, Texas
- The City of San Antonio, Texas

State and Federal Congressional Offices:
U.S. Senators

- Senator John Cornyn

- Senator Ted Cruz

U.S. Representatives

- Congressman Francisco Canseco
- Congressman Henry Cuellar
- Congressman Lloyd Dogett
- Congressman Blake Farenthold
- Congressman Charles Gonzales
- Congressman Ruben Hinojosa
- Congressman Ron Paul
- Congressman Lamar Smith

State Senators

- Senator Glenn Hegar
- Senator Leticia Van Deputte
- Senator Carlos I. Uresti
- Senator Jeff Wentworth
- Senator Judith Zaffirini

State Representatives

- Representative Jose Aliseda
- Representative Joaquin Castro
- Representative Joe Farias
- Representative Trey Martinez Fischer
- Representative Pete P. Gallego
- Representative John V. Garza
- Representative Roland Gutierrez
- Representative Harvey Hilderbran
- Representative Todd A. Hunter
- Representative Jason Isaac
- Representative Tracy O. King
- Representative John Langston Kuempel
- Representative Lyle Larson
- Representative Ruth Jones McClendon
- Representative Jose Menendez
- Representative Doug Miller
- Representative Geanie Morrison
- Representative Joe Strauss

- Representative Mike Villarreal

Conservation Organizations

- Gulf States National Resource Center
- San Antonio Audubon Society
- San Marcos River Foundation
- Sierra Club
- Sportsmen Conservationists of Texas
- Texas Nature Conservancy
- Texas Farm Bureau

The DEIS is available in PDF format on the SEP-HCP Web site at www.sephcp.com and on the Service's Web site at http://www.fws.gov/southwest/es/AustinTexas/.

Anyone wishing to review the permit application may request a copy by writing the Regional Director, U.S. Fish and Wildlife Service, P.O. Box 1306, Room 4012, Albuquerque, NM 87103.

CHAPTER 3
ALTERNATIVES

3.1 ALTERNATIVES DEVELOPMENT PROCESS

The identification of and evaluation of alternatives was informed through active community and public agency involvement. The alternative analysis process for the SEP-HCP involved input from the BAT, CAC, and the AOG. Through the AOG, the Service provided oversight and concurrence on the development and evaluation of the alternatives in the SEP-HCP which were carried forward into the EIS. Variables considered for each alternative include: 1) the Plan Area, the Enrollment Area, and the area where the preserve system could be located; 2) the amount of incidental take that would be requested for each of the Covered Species in the plan; 3) the conservation needs for each species, including mitigation ratio, preserve size, preserve distribution, Preservation Credit criteria, and participation fees; and 4) an estimated budget for implementing the alternative.

The alternatives considered during development of the SEP-HCP were initially identified from a review of other HCP models used in Texas and elsewhere across the country. These models include three general approaches for mitigating impacts to Covered Species: regulatory programs and pre-determined preserves.

3.1.1 Regulatory Programs

One approach for structuring an HCP is based on regulations designed to either require or provide an incentive for the conservation of an endangered species. This approach is not a realistic option for the SEP-HCP because 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, ordinance is necessary to implement [an HCP] for which the governmental entity was issued a Federal Permit.” The only exception to this prohibition is for regulations that involve groundwater withdrawal. A government 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 an 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 HCP. In short, a county’s ability to pass regulations for the purpose of protecting endangered species is extremely limited; therefore, the regulatory approach was not considered a model for the SEP-HCP.

3.1.2 Pre-determined Preserves

Under the pre-determined preserve model, the HCP would identify and delineate a target area for preserve acquisition that may or may not be owned by an applicant. Implementing this approach would trigger several provisions of Texas state law related to development of HCPs by local governments. Within this pre-determined target area, an 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 area, through participation in the HCP or through individual ESA authorizations.

Projects on land within the target area would not be allowed to participate in the HCP, but could seek ESA authorizations directly from 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 take) would be adequately minimized and mitigated and the continued existence of the species would not be jeopardized. The Balcones Cayonlands Conservation Plan in Travis County, Texas and the Riverside County and San Diego Multi-species Conservation Plans in California are examples of HCPs based on this model. Under current Texas state law an applicant would be required to acquire targeted properties within six years of permit issuance. This would mean that an applicant would need to have agreements with willing landowners and all of the funding in place within the first few years, if not before the issuance of the permit, to accomplish this goal. This would not be a practicable option for the SEP-HCP; therefore, the pre-determined preserve approach was not used for the SEP-HCP.

3.1.3 The Action Alternatives

Alternative development was an iterative process involving making changes to one variable, and reviewing the effects to other variables. Employing this method of changing a variable and reviewing how its resulting affects meet the purpose and need resulted in numerous alternatives that were suggested and refined. The first pre-application draft of the SEP-HCP proposed ten Preliminary Alternatives, including the No Action Alternative. These ten Preliminary Alternatives were presented to agencies, project stakeholders, and the public through a series of scoping meetings held throughout the Plan Area during the month of June 2011 (see **Chapter 2 – Public Scoping and Participation** for more information).

The input received during the scoping process helped to further refine the 10 Preliminary Alternatives into 4 Action Alternatives. Key factors that played a role in the identification of the Action Alternatives include: (1) several counties in the Plan Area formally requested to be removed from the Enrollment Area of the SEP-HCP and declined the opportunity to opt-in to the SEP-HCP in the future; and (2) the City of San Antonio requested that its city limits, ETJ, and the area where its ETJ will likely expand over the 30 year timeframe of the SEP-HCP be added to the Enrollment Area. Based on this feedback and comments received during scoping several of the Preliminary Alternatives were modified and several were eliminated from further consideration. Four Action Alternatives and the No Action Alternative were advanced for consideration in this EIS.

3.2 DESCRIPTION OF ALTERNATIVES CONSIDERED FOR DETAILED STUDY

3.2.1 No Action Alternative

NEPA regulations (section 1502.14(d)) require an EIS to include an alternative of no action. No action means “the proposed activity would not take place and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity or an alternative activity to go forward” (CEQ 1981). The No Action Alternative is defined as the conditions that can be expected if the Service does not issue an ITP to the Applicants for the SEP-HCP.

Under the No Action Alternative, compliance with the ESA will continue to occur on an individual basis through project-specific consultations with the Service. Local governments, business entities, private landowners, and others will independently determine whether or not ESA permitting is necessary for a project and, if needed, will work with the Service to obtain authorization for incidental take.

Individual permitting actions will occur at the level and scope of an individual project. Mitigation requirements will be individually negotiated with the Service based on the level of impact to listed species and the maximum practicable mitigation options available to each individual applicant.

Individuals seeking an ITP from the Service for non-federal actions will prepare their own HCP and the Service will have to comply with NEPA on each ITP. As discussed in **Chapter 1 – Introduction, Purpose and Need**, NEPA requires the identification of alternatives, an analysis of direct, indirect and cumulative impacts of the proposed action on the human environment, and the consideration of mitigation options.

Assembling the necessary project-related and species information, negotiating the details of the conservation program, and preparing the required documentation to apply for an ITP can take several years, depending on the circumstances of the individual project. The preparation of the appropriate documentation to support an individual permit application may require the developer to hire professional services including: biologists, NEPA professionals, legal counsel, and real estate professionals. Each application for incidental take will be individually reviewed before the issuance of a permit. Developers will be responsible for bearing all the costs of preparing the individual permit application package.

3.2.2 Common Characteristics of the Action Alternatives

The four Action Alternatives share several common characteristics:

ITP Process - All four Action Alternatives are an alternate means to comply with the ESA which will be administered by the Applicants.
Covered Species - All four Action Alternatives propose the incidental take of nine federally listed endangered species.
Voluntarily Conserved Species - All four Action Alternatives may impact species that are not federally listed as threatened or endangered and will not be covered under the Proposed Action. Impacts could result from habitat that will be taken and habitat that will be conserved.

Enrollment Area - All four Action Alternatives contemplate an Enrollment Area that includes the jurisdictions of Bexar County and the City of San Antonio including its ETJ and the area where the City of San Antonio's ETJ will likely be expanded over the 30 year timeframe of the SEP-HCP (except in Comal County). Use of the SEP-HCP's incidental take authorization will be limited to Covered Activities conducted on properties within the Enrollment Area (

Figure **1-1**).
Covered Activities: The ITP associated with the SEP-HCP will authorize a limited amount of incidental take of the Covered Species for the following Covered Activities:

1. Otherwise lawful land uses conducted in the Enrollment Area; and
2. Management and monitoring, and research activities on SEP-HCP preserves that may be located anywhere in the Plan Area.

The SEP-HCP will only cover incidental take that occurs on lands in the Enrollment Area that are enrolled by SEP-HCP Participants and on lands that are within the SEP-HCP preserve system. The SEP-HCP will not cover incidental take for projects outside of the Enrollment Area or that occurs within Comal County (as Comal County has its own HCP), except for incidental take associated with SEP-HCP preserve management, monitoring, and research activities. Examples of different types of non-federal projects or actions that will be Covered Activities include the following:

- The construction, use, and/or maintenance of public or private land development projects, including but not limited to single- and multi-family homes, residential subdivisions, farm and ranch improvements, commercial or industrial projects, government offices, and park infrastructure;
- The construction, maintenance, and/or improvement of roads, bridges, and other transportation infrastructure;
- The installation and/or maintenance of utility infrastructure, including but not limited to transmission or distribution lines and facilities related to electric, telecommunication, water, wastewater, petroleum or natural gas, and other utility products or services;
- The construction, use, maintenance, and/or expansion of schools, hospitals, corrections or justice facilities, and community service development or improvement projects;
- The construction, use, or maintenance of other public infrastructure and improvement projects (e.g., projects by municipalities, counties, school districts);
- The construction, use, maintenance and/or expansion of quarries, gravel mining, or other similar extraction projects; and
- Any activities necessary to manage habitat for the Covered Species that could temporarily result in incidental take but that would have long-term benefits for the species.

Mitigation Measures for GCWA and BCVI
Preservation Credits will be created by the SEP-HCP for each acre of GCWA and BCVI habitat protected, such that each acre of protected habitat yields one Preservation Credit. All Action Alternatives assume that the GCWA and BCVI preserve systems will be composed of consolidated tracts (smaller tracts of land will be consolidated into larger tracts) and will include some areas of non-habitat buffers; as such the SEP-HCP will purchase more land than needed to generate the appropriate number of Preservation Credit.

Mitigation Measures for Covered Karst Invertebrates
For all Action Alternatives, the SEP-HCP will establish new preserves with Covered Karst Invertebrates which will be distributed across the Bexar County Karst Fauna Regions (KFR) (except the Alamo Heights KFR). The impacts to the Covered Karst Invertebrates will be assessed based on the distance of the Covered Activities from known occupied karst features. Unless and until certain conservation baselines, which are derived from the Service's recovery standards for downlisting each of the Covered

Karst Invertebrates, are achieved, SEP-HCP Participants will be required to avoid conducting Covered Activities within the Occupied Cave Zone. If the downlisting criteria have been met for those species in that region, then compensation for incidental take will be assessed by participation fees. SEP-HCP Participants will be required to avoid conducting Covered Activities within designated Critical Habitat unless the Service determines, on a case-by-case basis, that the activities will not adversely modify such habitat. Participants will be fully covered for incidental take of the Covered Karst Invertebrates that might occur as a result of activities conducted beyond Occupied Cave Zone, including any take associated with any previously unknown features encountered during construction.

Adaptive Preserve Management and Monitoring

The primary conservation measure for the Covered Species is the acquisition, permanent protection and management of their habitats within the Plan Area. In order to ensure the permanent protection and management of Covered Species' habitat, the Applicants will establish an adaptive preserve management and monitoring process. This process includes establishing a baseline condition for each preserve, planning property-specific management strategies and practices, implementing management strategies and practices on an on-going basis, and evaluating the effectiveness of the management actions and adapting the management practices as needed. The Applicants will also provide the public with informational materials about the Covered Species and the SEP-HCP and how to participate in the SEP-HCP. In addition, the SEP-HCP will contribute to the understanding of the biology, ecology and conservation of the Covered Species by providing access, on a limited basis, to SEP-HCP preserves for research purposes.

Plan Administration and Maintenance

All Action Alternatives will require the Applicants to develop and follow an administrative and maintenance process. The specific roles and responsibilities of each Applicant will be detailed in an Interlocal Agreement between Bexar County and the City of San Antonio. It is expected that Bexar County will be responsible for most of the tasks needed to implement the SEP-HCP, including enrolling SEP-HCP Participants, acquiring and managing the preserve system, and coordinating with the Service. The City of San Antonio is expected to provide approximately 50 percent of the public funding needed to support the implementation of the Plan.

The Applicants may convene at least two standing advisory committees to provide on-going input on the implementation of the SEP-HCP: a scientific advisory committee and a stakeholder advisory committee. The operational rules for these committees will include opportunities for regular public involvement. Public input may also be received via other special public meetings or hearings called by the Applicants. The SEP-HCP includes a number of reporting and coordination tasks to demonstrate that the Plan is being properly implemented. Annual reports on Plan enrollment, the preserve system, monitoring activities, financial status, and compliance issues will be submitted to the Service in compliance with 40 CFR 1505.2(c). Regular coordination with the Service regarding the enrollment of new Participants, new preserve acquisitions, adaptive preserve management, and secondary uses of preserve lands is also expected. Upon request the annual reports will be made available to federal and state agencies and the public in compliance with 40DFR 1505.3.

Cost Estimates

The cost estimates for all Action Alternatives assume that the entire allocation of incidental take authorization will be used by the SEP-HCP Participants within the 30-year timeframe of the SEP-HCP. As such, the cost estimates represent the maximum costs for acquisition of preserve land; SEP-HCP

administration; preserve management, monitoring, and other conservation measures; as well as contributions to a contingency fund and management endowment.

Financing Options
All four Action Alternatives will require some level of public funding. The Applicants will be responsible for providing this public funding.

The Bexar County Fiscal Year (FY) 2013-2014 Adopted Budget totals $1.69 billion which is $201 million more than the FY 2012-2013 Adopted Budget. The 2013-2014 budget includes:

- $485 million in operating appropriations,
- $821 million in capital projects,
- $124 million for debt services,
- $218 million for reserves, and
- $31 million contingencies.

The Bexar County FY 2013-14 Proposed Budget is balanced at a tax rate of 0.326866 per $100 valuation, which is greater than the effective tax rate of 0.317028 per $100 valuation. The budget includes approximately seven million more in revenue from properties taxes in FY 2013-2014 than the previous year as a result of new properties being added to the tax roll (Bexar County 2013).

The FY 2013-2014 City of San Antonio Budget totals approximately $ 2.3 billion which is a 1 percent decrease from FY 2012-2013. The budget includes:

- $1.68 billion in operating expenses which includes $988 million in General Fund expenditures,
- $570 million in the Capital Improvement Program, and
- $89 million in financial reserves.

The FY 2013-14 is balanced at a tax rate of 0.56569 per $100 valuation, which is greater than the effective tax rate of 0.54638 per $100 valuation. The budget includes approximately six million more in revenue from properties taxes in FY 2013-2014 than the previous year as a result of new properties being added to the tax roll (City of San Antonio 2013).

3.2.3 Proposed SEP-HCP Alternative
The Proposed SEP-HCP Alternative assumes 50 percent of the development activities requiring an ITP for the Covered Species over the next 30 years will participate in the SEP-HCP. The incidental take acreage represents 50 percent of the projected GCWA and BCVI habitat loss and 20 percent of loss of potential habitat for the Covered Karst Invertebrates resulting from land development projects within the Enrollment Area over the next 30 years (

Table 0-1).

Table 0-1: Take Request, Proposed Conservation & Mitigation – Proposed SEP-HCP Alternative

Covered Species	Take Request	Proposed Conservation	Participation Fees & Mitigation Requirement

GCWA	9,371 acres	23,430 acres of preserve Goal to acquire preserve land in Bexar County	$4,000 per credit 2:1 mitigation ratio for direct impacts 0.5:1 mitigation ratio for indirect impacts
BCVI	2,640 acres	6,600 acres of preserve Goal to purchase preserve land in Bexar County	$4,000 per credit 2:1 mitigation ratio for direct impacts 0.5:1 mitigation ratio for indirect impacts
Covered Karst Invertebrates	10,234 acres (Zone 1 & 2) 10,852 acres (Zone 3 & 4) 49 occupied features	1,000 acres distributed across Bexar karst zones (excludes Alamo Heights KFR) *Note: It's likely that the 1,000 acres will be distributed over Karst Zones 1 & 2, based on the unlikelihood that Recovery Quality Karst Preserve will be found in Karst Zones 3 &4.*	Avoid activity within 750 feet until a certain number of preserves needed to achieve the conservation baseline for that species are met. $400,000 in Occupied Cave Zone A (0 to 345 feet buffer) $40,000 in Occupied Cave Zone B (345 to 750 feet buffer)

Source: SEP-HCP 2013.

The total estimated cost to implement the Proposed SEP-HCP Alternative is $299,474,000 over the life of the permit of which 74 percent will be paid for through participation fees and 26 percent will be sourced from public funding. Sources of public funding could include impact fees, grants, sales tax revenue, tax increment finance zones (TIFs), or other real estate transfer taxes.

3.2.4 10% Participation Alternative

The 10% Participation Alternative represents the alternative with a reduced amount of take. It assumes 10 percent of the development activities requiring an ITP for the Covered Species over the next 30 years will participate in the SEP-HCP. The incidental take request represents 10 percent of the projected GCWA and BCVI habitat loss and 10 percent of the loss of Karst Zones 1-4 resulting from development within the Enrollment Area over the next 30 years (**Table 0-2)**.

Table 0-2: Take Request, Proposed Conservation & Mitigation – 10% Participation Alternative

Covered Species	Take Request	Proposed Conservation	Participation Fees & Mitigation Requirement
GCWA	2,100 acres	5,250 acres of preserve	$4,000 per credit 2:1 mitigation ratio for direct impacts 0.5:1 mitigation ratio for indirect impacts
BCVI	556 acres	1,390 acres of preserve	$4,000 per credit 2:1 mitigation ratio for direct impacts 0.5:1 mitigation ratio for indirect impacts
Covered Karst Invertebrates	5,117 acres (Zone 1 & 2) 5,426 acres (Zone 3 & 4) 25 occupied features	750 acres distributed across Bexar karst zones concentrated in Zones 1 & 2 (excludes Alamo Heights KFR)	Avoid activities within 750 feet Avoid, minimize, mitigate to maximum practicable extent $400,000 in Occupied Cave Zone A (0 to 345 feet buffer) $40,000 in Occupied Cave Zone B (345 to 750 feet buffer)

Source: SEP-HCP 2013.

The total estimated cost to implement the 10% Participation Alternative is $131,060,000 over the life of the permit of which 47 percent will be paid for through participation fees and 53 percent will be sourced from public funding.

3.2.5 Single-County Alternative

The Single-County Alternative proposes the preserve system will be located within Bexar County and/or within 10 miles of the Bexar County border. This mitigation requirement was modeled after other single-county HCPs in Central Texas, such as the Williamson County HCP. This alternative proposes the same amount of take for the Covered Species as the Proposed SEP-HCP Alternative; however, it proposes one-half of the preserve for GCWA and BCVI and greater participation fees. The reduced conservation levels are based on a 1:1 direct impact mitigation ratio (**Table 0-3**). This alternative will have higher costs per acre of habitat preserve than the other Action Alternatives because the land in the more suburban Bexar County has a higher appraisal value.

Table 0-3: Take Request, Proposed Conservation & Mitigation – Single-County Alternative

Covered Species	Take Request	Proposed Conservation	Participation Fees & Mitigation Requirement
GCWA	9,371 acres	11,714 acres of preserve Requires all preserves to be within Bexar County or within 10 miles of the county border	$10,000 per credit 1:1 mitigation ratio for direct impacts 0.5:1 mitigation ratio for indirect impacts
BCVI	2,640 acres	3,300 acres of preserve Requires all preserves to be within Bexar County or within 10 miles of the county border	$10,000 per credit 1:1 mitigation ratio for direct impacts 0.5:1 mitigation ratio for indirect impacts
Covered Karst Invertebrates	10,234 acres (Zone 1 & 2) 10,852 acres (Zone 3 & 4) 49 occupied features	1,000 acres distributed across Bexar karst zones but concentrated in Zones 1 & 2 (excludes Alamo Heights KFR)	Avoid activity within 750 feet until a certain number of preserves needed to achieve the conservation baseline for that species are met.
			$400,000 in Occupied Cave Zone A (0 to 345 feet buffer) $40,000 in Occupied Cave Zone B (345 to 750 feet buffer)

Source: SEP-HCP 2013.

The total estimated cost to implement the Single-County Alternative is $564,010,000 over the life of the permit of which 46 percent will be paid for through participation fees and 54 percent will be from public funding.

3.2.6 Increased Mitigation Alternative

The Increased Mitigation Alternative incorporates input received from the CAC and the BAT. These advisory groups suggested greater protection measures for some of the Covered Species than the other Action Alternatives. This includes higher proposed habitat conservation for the GCWA, and two times the required amount of preserve needed to achieve down-listing for the Covered Karst Invertebrates. The advisory groups also suggested that 60 percent of the GCWA preserve should be within Bexar County and/or within 5 miles of the county border. Like the Proposed SEP-HCP Alternative, the Increased Mitigation Alternative assumes 50 percent of the development activities requiring an ITP for

the Covered Species over the next 30 years will participate in the SEP-HCP which represents 50 percent of the projected GCWA and BCVI habitat loss and 20 percent of the loss of Karst Zones 1-4 resulting from development within the enrollment area over the next 30 years (**Table 0-4**).

Table 0-4: Take Request, Proposed Conservation & Mitigation – Increased Mitigation Alternative

Covered Species	Take Request	Proposed Conservation	Participation Fees & Mitigation Requirement
GCWA	9,371 acres	35,141 acres of preserve Requires 60 percent (21,085 acres) to be within Bexar County or within 5 miles of the county border	$5,500 per credit 3:1 mitigation ratio for direct impacts 0.5:1 mitigation ratio for indirect impacts
BCVI	2,640 acres	6,600 acres of preserve	$5,500 per credit 2:1 mitigation ratio for direct impacts 0.5:1 mitigation ratio for indirect impacts
Covered Karst Invertebrates	10,234 acres (Zone 1 & 2) 10,852 acres (Zone 3 & 4) 49 occupied features	2,000 acres distributed across Bexar karst zones (excludes Alamo Heights KFR)	Avoid activity within 750 feet until 2 times the number of preserves needed to achieve the conservation baseline for that species is met.
			$400,000 in Occupied Cave Zone A (0 to 345 feet buffer) $40,000 in Occupied Cave Zone B (345 to 750 feet buffer)

Source: SEP-HCP 2013.

The total estimated cost to implement the Increased Mitigation Alternative is $1,122,090,000 over the life of the permit of which 37 percent will be paid for through participation fees and 63 percent will be sourced from public funding.

3.3 COMPARISON OF PROPOSED ALTERNATIVES

Table 0-5: Comparison of Proposed Alternatives

Covered Species	No Action Alternative	Proposed SEP-HCP Alternative	10% Participation Alternative	Single-County Alternative	Increased Mitigation Alternative
Incidental Take Request					
GCWA	Compliance with the ESA will continue to occur on an individual basis through project-specific consultations with the Service. Applicants will independently determine whether or not ESA permitting is necessary for a project and, if needed, will work with the Service to obtain authorization for incidental take.	9,371 acres	2,100 acres	9,371 acres	9,371 acres
BCVI		2,640 acres	556 acres	2,640 acres	2, 640 acres
Covered Karst Invertebrates		10,234 acres (Zone 1 & 2) 10,852 acres (Zone 3 & 4) 49 occupied features	5,117 acres (Zone 1 & 2) 5,426 acres (Zone 3 & 4) 25 occupied features	10,234 acres (Zone 1 & 2) 10,852 acres (Zone 3 & 4) 49 occupied features	10,234 acres (Zone 1 & 2) 10,852 acres (Zone 3 & 4) 49 occupied features

Covered Species	No Action Alternative	Proposed SEP-HCP Alternative	10% Participation Alternative	Single-County Alternative	Increased Mitigation Alternative
Proposed Conservation					
GCWA	Individual permitting actions will occur at the level and scope of an individual project. Mitigation requirements will be individually negotiated with the Service. Possible forms of mitigation could include on-site conservation of habitat, acquisition of off-site preserve lands, or purchase of Preservation Credits from an independent Service-approved conservation bank. The perpetual management and monitoring of individual habitat preserves will be under the purview of the permit applicant.	23,430 acres (Mostly rural areas)	5,250 acres (Mostly rural areas)	11,714 acres (Bexar County or within 10 miles)	35,141 acres 21,085 acres in Bexar County or within 5 miles 14,056 acres in mostly rural areas
BCVI		6,600 acres (Mostly rural areas)	1,390 acres (Mostly rural areas)	3,300 acres (Bexar County or within 10 miles)	6,600 acres (Mostly rural areas)
Covered Karst Invertebrates		1,000 acres	750 acres	1,000 acres	2,000 acres
Participation Fees					
GCWA	Compliance with the ESA will continue to occur on an individual basis through project-specific consultations with the Service. Applicants will be responsible for bearing all the costs of preparing the individual permit application package.	$8,000 per acre (Direct Impacts) $2,000 per acre (Indirect Impacts)	$8,000 per acre (Direct Impacts) $2,000 per acre (Indirect Impacts)	$10,000 per acre (Direct Impacts) $5,000 per acre (Indirect Impacts)	$16,500 per acre (Direct Impacts) $2,750 per acre (Indirect Impacts)
BCVI		$8,000 per acre (Direct Impacts) $2,000 per acre (Indirect Impacts)	$8,000 per acre (Direct Impacts) $2,000 per acre (Indirect Impacts)	$10,000 per acre (Direct Impacts) $5,000 per acre (Indirect Impacts)	$11,000 per acre (Direct Impacts) $2,750 per acre (Indirect Impacts)
Covered Karst Invertebrates		$40,000 (345 to 750 ft buffer), $400,000 (0 to 345 ft buffer)			
Total Costs and Revenue Sources					
Total SEP-HCP Cost	The No Action will not result in costs beyond those that an individual incurs to comply with ESA, nor will it generate revenues.	$299,474,000	$131,060,000	$564,010,000	$1,122,090,000
Participation Fees		74%	47%	46%	37%

Covered Species	No Action Alternative	Proposed SEP-HCP Alternative	10% Participation Alternative	Single-County Alternative	Increased Mitigation Alternative
Public Funding		26%	53%	54%	63%

Source: SEP-HCP 2013.

CHAPTER 4

AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

4.1 THE AFFECTED ENVIRONMENT

The description of the affected environment establishes the current environmental conditions considered by the Service to be potentially affected by the Proposed Action. In order to provide a succinct description of those resources that may be affected by the Proposed Action and a level of analysis that is commensurate with the importance of the impact, some resources and topics are analyzed in detail and others are considered but eliminated from further analysis. As stated in CEQ regulation 40 CFR 1502.2(b), a succinct discussion shall be provided for the issues and topics that were considered but dismissed from detailed study, describing why more study is not warranted. The following provides a brief discussion of the issues and resources considered but dismissed from detailed analysis followed by the resources analyzed in detail.

4.1.1 Issues and Resources Considered but Dismissed from Detailed Analysis

Several of the resources listed below could be affected by individual land development or land use activities conducted in the Plan Area; however, the Proposed Action cannot be shown to cause such impacts, even indirectly, because the same activities could, and will likely, continue with or without the implementation of the SEP-HCP. Therefore, issuance of an ITP with the SEP-HCP is not likely to cause more than negligible impacts to the following resources.

Energy and Depletable Resource Requirements and Conservation Potential

The Proposed Action does not include an energy or resource extraction component and will not require energy or resources to be depleted; therefore, this topic is dismissed from detailed analysis.

Prime and Unique Farmlands

The *Farmland Protection Policy Act* (FPPA), Subtitle I of Title XV of the *Agricultural and Food Act of 1981*, Pub. L. 97-98, provides protection to prime and unique farmlands. Prime and unique farmlands are defined by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops" (NRCS 2011). The purpose of the FPPA is to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of prime, unique, and other farmlands of statewide or local importance to non-agricultural uses.

According to the NRCS soil data there is prime farmland in the Plan Area located primarily east of the Balcones Escarpment; which is typically delineated by the I-35. In analyzing the impacts of the Proposed Action on prime and unique farmlands, consideration is given to the impacts of taking Covered Species habitat as well as conserving habitat. Suitable habitat for the Covered Species includes woodland, shrubland, and Karst Zones 1-4. These habitats are not generally used for agricultural production; woodlands and shrubland habitats are sometimes used as rangeland. The Covered Activities could impact prime and unique farmland; however, these impacts would be minimal because there is little prime farmland that overlaps the Covered Species habitat in the Enrollment Area. The incidental inclusion of prime farmlands into the preserve system will not convert the use of the land to a non-

agricultural purpose. As such the Proposed Action is not anticipated to have an effect on prime and unique farmlands.

Public Health and Safety

The Proposed Action will not likely detract from or contribute to public health or safety. While there may be an expectation that preserve lands, purchased by public entities, will have some level of public access, the primary purpose of the preserve system is for the long-term conservation of the Covered Species. Secondary use of preserve lands will not be authorized if the use will have a reasonable likelihood of materially reducing the long-term conservation value of the protected habitat for the Covered Species. As such, it is unlikely that public recreational use of the preserve system for public health purposes will be authorized. The effects to public health and safety are dismissed from further analysis.

Wetlands and Floodplains

Wetlands and floodplains are generally associated within the water resources in the Plan Area, which are discussed in more detail in **Section 4.3.**

Activities causing the loss of suitable habitat for the Covered Species or the designation of preserve lands could affect wetlands and floodplains where these resources overlap such activities. However the potential for overlap is slight because suitable habitat for the Covered Species does not typically occur in wetland or floodplain areas. And, the incidental inclusion of wetlands and floodplains within the preserve system will protect such resources from future land development.

Wetlands and all 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 (the Corps). Projects that affect jurisdictional wetlands or waters of the U.S. may be required to obtain a permit from the Corps prior to construction and may be required to provide compensatory mitigation to offset any adverse environmental effects. As one of its responsibilities, the Federal Emergency Management Agency (FEMA) manages the National Flood Insurance Program (NFIP) and oversees the floodplain management and mapping components of the program. NFIP was created by the *National Flood Insurance Act of 1968* to provide an insurance alternative to government-sponsored disaster assistance to help pay for damages that result from flood. In order to participate, local jurisdictions must adopt a floodplain management ordinance to manage construction activities within special flood hazard areas (SFHA), which include floodplains. All seven counties and several local jurisdictions in the Plan Area participate in NFIP and have established an authority, through the adoption of a flood damage prevention court order, to monitor and permit development within floodplains. The Bexar Regional Watershed Management Program is a collaborative effort between Bexar County, the City of San Antonio, the San Antonio River Authority and other suburban jurisdictions to manage watershed issues including flood control within the region. All projects occurring within the Plan Area, including those that might enroll in the SEP-HCP must comply with all applicable regulations regarding wetlands and floodplains. Because wetlands and floodplains are already protected by existing regulations, the Proposed Action is not expected to have an impact, and as such, these resources are not analyzed in detail.

Cultural Resources

Projects that are federally permitted, licensed, funded, or partially funded with federal money must comply with section 106 (36 CFR 800.16) of the *1966 National Historic Preservation Act* (NHPA). Section 106 requires that every federal agency consider the impacts of their actions on historic properties.

According to section 106 of the NHPA, 'historic properties' include those that are at least fifty years old and that are listed on or eligible for inclusion in the National Register of Historic Places (NRHP). This includes both historic properties and archeological properties. The NRHP, which is maintained by the Secretary of the Interior, is a historic resources inventory that includes buildings, structures, objects, sites, and districts. Section 106 also requires federal agencies to seek comments from an independent reviewing agency, the Advisory Council on Historic Preservation (ACHP). The ACHP has developed a process for carrying out section 106 responsibilities which is defined in its regulations entitled Protection of Historic Properties, 36 CFR 800. The NHPA also provides for the designation and appointment of a State Historic Preservation Officer (SHPO) in each state to administer the state's historic preservation program of maintaining inventories of historic properties.

In addition to federal regulations, cultural resources located on land owned or controlled by the State of Texas, one of its cities or counties, or other political subdivisions, are protected by the Texas Antiquities Code (TAC). Cultural resources may include archeological, historic, architectural sites, and places of particular significance to traditional cultures. Under the TAC, any historic or prehistoric property located on publicly-owned or other lands under the jurisdiction of the State of Texas may be determined eligible as a State Archeological Landmark (SAL). Conditions for formal landmark designation are covered in Chapter 26 of the SHPO/Texas Historical Commission's (THC) Rules of Practice and Procedure for the Antiquities Code of Texas. All groundbreaking activities affecting public land must be authorized by the THC Department of Antiquities Protection. Authorization includes a formal Antiquities permit, which stipulates the conditions under which survey, discovery, excavation, demolition, restoration, or scientific investigations will occur.

In Texas, archeological and historical properties that are on private property are not protected by federal or state law, unless a federal undertaking is involved, or a subdivision of the state has jurisdiction through an easement or ownership. As previously stated, state public lands are under the purview of the TAC. As the preserve system established under the SEP-HCP will be administered by and under the jurisdiction of the Applicants, any cultural resources eligible for SAL designation on these lands will be protected under the TAC. Moreover, any significant historic or archeological resources on enrolled properties will be protected by the NHPA. However, since historical and archeological resources are location specific and enrolled properties and preserve lands are not identified in the SEP-HCP, the effects of the Proposed Action on cultural resources cannot be determined.

SEP-HCP Participants and Applicants will have to comply with federal and state laws protecting cultural resources. It will be their responsibility to conduct inventories, and consider the effects of permitting and maintenance on cultural resources within the Enrollment Area and within the preserves and consult with the Texas Historical Commission.

Since these laws provide protection for cultural resources both within preserves and on permitted land, and the location of such lands cannot be identified further, analysis of impacts to cultural resources is not conducted in this EIS.

Geology
The geology of the Plan Area includes Cretaceous limestone and Quaternary alluvial terrace deposits. The Cretaceous rock includes limestone of the Edwards Aquifer and confining units above and below the primary water bearing units of the Edwards Group and Georgetown Formation. Other significant aquifer units in the local region include the Trinity Aquifer, consisting of older Cretaceous limestone, primarily in the Glen Rose Formation, and to a lesser extent some usable groundwater is found in the Austin Chalk in rocks younger than the Edwards Group. In areas with significant surface water streams, alluvial terrace and associated clastic sediments provide a thin cover over the limestone.

Impacts to geology are not addressed except as they pertain to groundwater. Texas Commission on Environmental Quality (TCEQ) regulations protect groundwater resources and the geologic features that provide recharge, including caves. If a construction project would impact a cave that does not provide recharge, the TCEQ regulations prescribe that these caves be filled. Because there are existing rules that regulate geology, as it pertain to groundwater, the SEP-HCP would not result in an impact. Impacts to groundwater resources are addressed in the water resources analysis below.

Air Quality
Air pollution may contribute to adverse human health impacts and ecosystem degradation. Major sources of air pollution come from point sources, such as stationary industrial, commercial, and construction and mining equipment and non-point sources such as lawn and garden equipment and motor vehicles. The *Clean Air Act of 1970* (CAA), as amended, resulted in requirements to consider the impact that proposed federal actions may have on air quality. Under the CAA, the Environmental Protection Agency (EPA) sets national ambient air quality standards (NAAQS) for seven air pollutants to protect public health and the environment, with an adequate margin of safety: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter, 10 and 2.5 microns and less (PM_{10} and $PM_{2.5}$) and lead (Pb). EPA delegated authority for monitoring and enforcing air quality regulations in Texas to the Texas Council on Environmental Quality (TCEQ) Office of Air Quality. In 2002 there were 13 regions in the state of Texas that were not in attainment with the 8-hour ozone standard including the San Antonio region (Bexar and Comal counties). As such the state of Texas, along with 33 other states, submitted an agreement to the EPA pledging to meet the 1997 8-hour ozone standard earlier than required. The most significant milestone in this agreement was that the State had to be in attainment by December 31, 2007, based on air quality data from 2005, 2006, and 2007. The San Antonio region submitted a plan or early action compact (EAC) in 2004 to demonstrate achievement of the ozone standards to TCEQ for inclusion in the State Implementation Plan.

On April 15, 2008, the EPA issued final action which designated the San Antonio EAC area as in attainment with the 8-hour ozone standard; the San Antonio region had met all the milestones of their EAC program and demonstrated attainment of the eight-hour ozone standard by the December 31, 2007 deadline. Provided that the area continues to monitor their attainment status no further action is required. However, the EPA has been contemplating a reduction in the eight-hour ozone standard and is in the process of gathering input from the agency's science advisors. Upon enactment of a new standard, it is possible that the San Antonio region will no longer be in attainment with the eight-hour ozone standard. As such, actions, including the proposed action, which could result in impacts to air quality, are of concern.

The conservation of habitat for the Covered Species could result in beneficial impacts to air quality. Conservation of open space has been shown to improve air quality by protecting the plants that naturally

create oxygen and filter out air pollutants such as ozone, sulfur dioxide and carbon monoxide (Sherer 2003; Coder 1996). However the extent of these benefits is largely tied to location of the open spaces as well as the density and type of vegetation. At this time, the location of habitat preserve lands, and the size of the preserve tracts has not been identified for the proposed SEP-HCP and as such, the effects of the Proposed Action on air quality cannot be measured although they are expected to be negligibly beneficial. The issuance of the Permit cannot be shown to cause air quality impacts, even indirectly, because ESA compliance and conservation of habitat will occur whether or not the SEP-HCP is implemented.

The Covered Activities contemplated in the SEP-HCP could have an adverse effect on air quality such as from the temporary use of heavy machinery and other construction activities, and the removal of existing vegetation. However, the magnitude of any potential effects from machinery or burning activities related to the clearing of habitat for the Covered Species would be negligible, since these types of activities already occur in the SEP-HCP Plan Area for agricultural and development activities, and would be temporary in nature. The Proposed Action is not a prerequisite for or a catalyst to land development activities; land development is anticipated to occur whether or not the SEP-HCP is implemented; therefore, the impacts of the Proposed Action on air quality will be negligible.

Noise

Land development activities, including the removal or alteration of vegetation with heavy machinery, could temporarily add to the ambient noise levels. As such, development projects enrolled in the SEP-HCP may also result in noise impacts; however, the magnitude of these potential effects are expected to be negligible, and any increases in ambient noise resulting from clearing activities will be temporary in nature. Land development activities are expected to continue regardless of whether or not the SEP-HCP is implemented and impacts associated with the Proposed Action cannot be shown to cause such impacts.

Environmental Justice

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 impacts of its programs, policies, and activities on minority and low-income populations” (Federal Register 1994). Minority and low-income populations do live in the Plan Area. Data from the 2010 Census shows that almost 2 million people live in the Plan Area of which 64.5 percent, or almost 1.28 million people, are minority. Based on the 2006 to 2010 5-year American Community Survey conducted by the U.S. Census Bureau, more than 131,000 people surveyed in the Plan Area, or 19.4 percent, earn an income that is less than the 2012 poverty guidelines for a 3-person household, as established by the U.S. Department of Health and Human Services and are considered low-income (U.S. Census Bureau 2010).

Potential impacts to the environmental justice population could result from the conservation of habitat and from the Covered Activities proposed in the SEP-HCP. Studies have suggested that the conservation of open space could have the effect of increasing property values of the surrounding land (McConnell and Walls 2005). In addition, the effects associated with land development activities could adversely affect environmental justice populations. These effects however are not likely to adversely impact environmental justice populations in the SEP-HCP Plan Area because minority and/or low-income populations live predominantly in the urbanized area of Bexar County and central and southern Medina County and largely in areas that do not overlap Covered Species’ habitat. The adverse effects of

the Covered Activities would impact all people, environmental justice populations and non-environmental justice populations alike. As such, the Covered Activities and the acquisition of preserve lands will not result in disproportionately high and adverse human health or environmental impacts to environmental justice populations; therefore, environmental justice is dismissed from detailed analysis in this EIS.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act, as amended requires that selected rivers in the U.S., including their immediate environments, that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, be preserved in free-flowing condition, and that they and their immediate environments be protected for the benefit and enjoyment of present and future generations. A 191-mile segment of the Rio Grande, which passes through Big Bend National Park and the Chihuahuan Desert, is the only river segment in the state of Texas designated as a wild and scenic river. This segment of the Rio Grande is not located in the Plan Area and therefore impacts to wild and scenic rivers are not analyzed further (National Wild and Scenic Rivers 2011).

National Forests and Grasslands

In the state of Texas there are four National Forests: Angelina, Davy Crockett, Sabine and Sam Houston, all of which are located in East Texas. The Caddo-Lyndon B. Johnson National Grasslands and the Rita Blanco Grasslands are the only National Grasslands in the state. None of these protected resources are located within the Plan Area (USDA Forest Service). The Proposed Action would not impact National Forests or Grasslands which is why these resources are not analyzed in detail in the EIS.

4.2 ASSESSMENT OF IMPACTS

4.2.1 Types of Impacts

The following sections provide a description of the current environmental condition of the resources being potentially impacted by the Proposed Action followed by an analysis of the impacts that the Proposed Alternatives, discussed in **Chapter 3 - Alternatives,** could have on these resources. Each resource is analyzed for several types of impacts: direct, indirect, beneficial, and adverse. These terms have been defined in the CEQ's NEPA regulation 40 CFR 1508, as shown below:

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

Per 40 CFR 1508.27, the significance of an impact must be considered in terms of both its context as well as the intensity of the impact. These terms are defined as:

- **Context:** the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected regions, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance will usually depend upon the impacts in the locale rather than in the world as a whole. Both short-term and long-term impacts are relevant.
- **Intensity:** refers to the severity of the impact.

In this Draft EIS the context of an impact is described in the narrative for each resource and is based on the above requirements. The intensity of an impact is ranked as negligible, minor, moderate or major and is defined for each resource topic. Following the direct and indirect analysis for each resource, this chapter concludes with an analysis of cumulative impacts, unavoidable adverse impacts, irreversible and irretrievable commitment of resources, and short-term use of the environment versus long-term productivity.

4.3 WATER RESOURCES

4.3.1 Affected Environment

Groundwater Resources

Four major aquifers, the Carrizo, Edwards Balcones Fault Zone (BFZ), Edwards-Trinity, and Trinity; and two minor aquifers, the Ellenburger-San Saba and Hickory aquifers, underlie the Plan Area. The most significant aquifer, in terms of the volume of water pumped for human use, is the Edwards BFZ Aquifer (Edwards Aquifer).

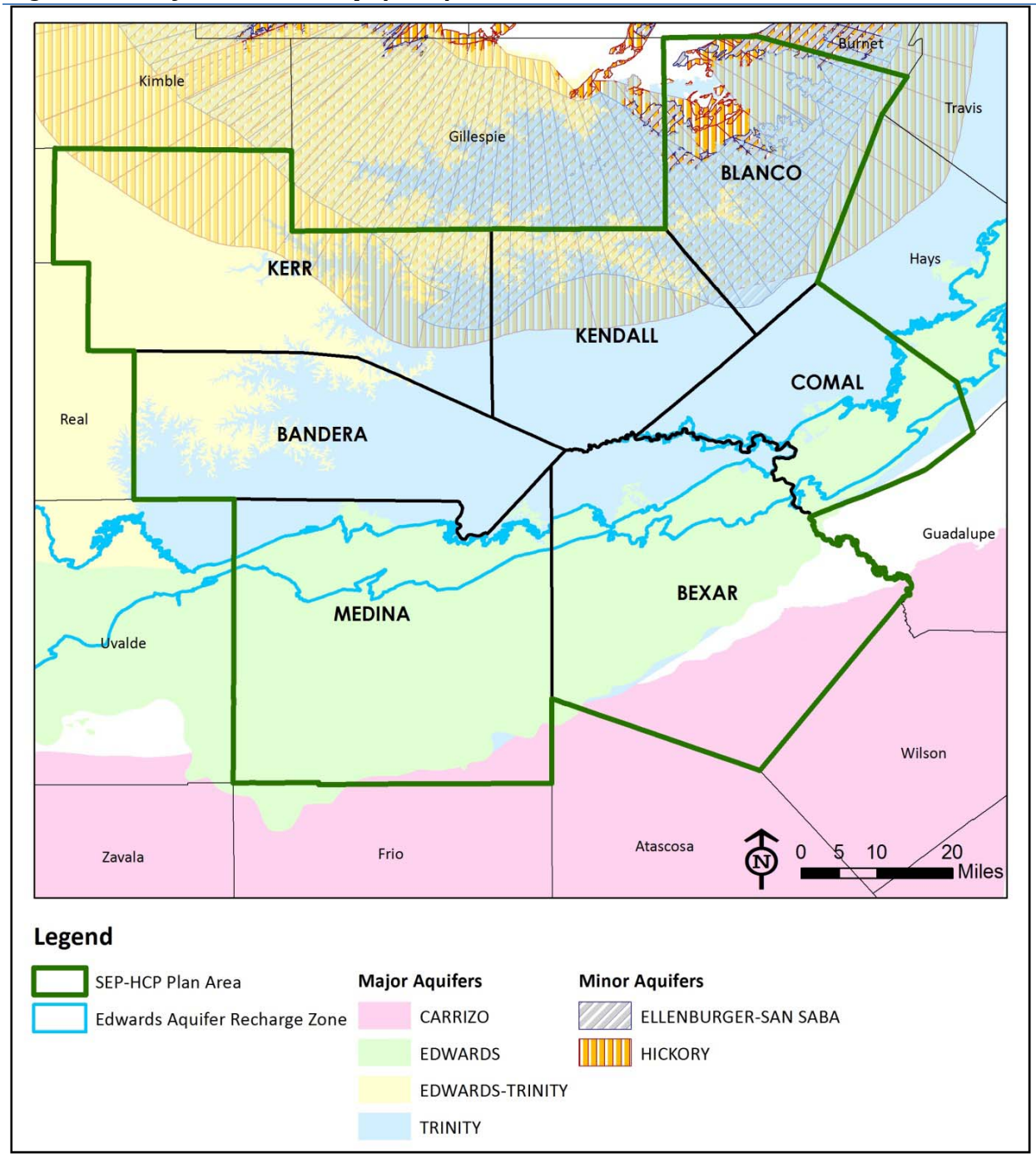
The Edwards Aquifer supplies water to millions of users including users in Bexar, Medina, and Comal counties in the Plan Area, and is the primary water source for the City of San Antonio. The Edwards Aquifer is known to store and transmit large quantities of water, and is subject to very rapid recharge in the area where the aquifer is unconfined; or where the upper limit of the aquifer is located at the water table. This zone is referred to as the recharge zone (**Figure 4-1**), and is extremely sensitive to environmental impact. Contaminants originating from human activities that occur in the recharge zone have the potential to degrade the groundwater quality.

The Edwards Aquifer also provides the source water for many major springs in Texas, including the two largest: Comal Springs in Comal County and San Marcos Springs in Hays County. These spring systems serve as the sole known habitat for a number of federally listed aquatic species. The confined portion of the Edwards Aquifer has a slower recharge rate than the unconfined portion because the surrounding rock and soil, above and below, are less permeable and let less water pass through. The confined zone of the Edwards Aquifer extends to the south and southeast of the recharge zone and is where the highest capacity wells and largest springs exist (Collins and Hovorka 1997).

The limestone of the Edwards Group has excellent water quality conditions, and the focused recharge zones and enhanced secondary porosity (additional fractures in the rock that occurred after the limestone was formed) allow more water to pass through. These factors make the Edwards Aquifer one of the most productive groundwater reservoirs in the country (Sharp and Banner 1997). In the northwestern portion of the Plan Area, the Edwards Group rocks have been eroded away and are not present. Here, the Upper Glen Rose is exposed; this area is classified as a contributing zone to the Edwards Aquifer. Heading southeast from the contributing zone, the limestone of the Edwards Group becomes exposed to the surface and is referred to as the recharge zone. Southeast of the recharge zone, the Edwards Aquifer

become confined by the Del Rio unit above and the Glen Rose unit below. The Glen Rose and Del Rio units have low permeability and therefore less recharge is possible in these areas (Ferrill *et al.* 2004).

Figure 4-1: Major and minor aquifers of the Plan Area



Source: Texas Water Development Board 2010.

The Trinity Aquifer is located within older rocks than those in the Edwards Group limestone, and lies below the Edwards Aquifer in areas where the Edwards is present. In the southeast portion of the Plan Area, the Trinity Aquifer is below the Edwards Aquifer recharge and confined zones. North and

northwest of the Edwards Aquifer recharge zone is the outcrop section of the Trinity Aquifer, where the bedrock is visible exposed, which is also considered the contributing zone to the Edwards Aquifer. The Trinity Aquifer in this area is karstic, and numerous minor springs exist, primarily in areas that have been cut into by surface streams. The water in this portion of the Trinity Aquifer is generally of very good quality.

The western-most portion of Kerr County and a limited portion of northern Kendall County are included in the Edwards-Trinity Aquifer system. This aquifer is located where the Edwards Group limestone caps the underlying Trinity limestone. Water quality in the Edwards-Trinity Aquifer is generally good, but the amount of available water is less than from the Edwards BFZ Aquifer.

Much of Blanco County and portions of Kendall and Kerr counties are included in the extent of the Ellenburger-San Saba Aquifer. This aquifer is located in much older Paleozoic limestone and provides usable amounts of high quality groundwater. This aquifer underlies the Edwards-Trinity and Trinity Aquifers in much of this area. Also in northern Blanco County, the Hickory Aquifer is found in isolated outcrops. This is a sandstone aquifer of good quality and moderate quantity.

To the southeast of the Edwards lies the Carrizo-Wilcox Aquifer, which is a sandstone aquifer supplying water to much of the Interior Coastal Plain Region. The Carrizo-Wilcox Aquifer is characterized by relatively slow transport time and has a high degree of storage. The quality of the water is good.

Groundwater Recharge

Approximately 80 percent of recharge into the Edwards Aquifer occurs in losing streams, where surface water flows over faults, fractures, and karst features that have been made more porous through weathering and erosion as the water passes through (Sharp and Banner 1997). Periods of recharge are intermittent as most streams in south-central Texas are ephemeral and only flow briefly after rainfall events; however, the recharge capacity of surface water into the aquifer is extremely efficient due to the porous nature of the system. Water passing over the contributing zone (Glen Rose outcrop) and into major fault zones and exposed, heavily karstified Edwards Group limestone (recharge zone), is rapidly transferred directly to the aquifer with little or no filtration.

The geologic mechanisms that form karst are complex, and many factors affect how karst is expressed. These factors control the way the groundwater flow system evolves, and ultimately how groundwater is recharged, transmitted, and naturally discharged through the aquifer system.

Groundwater movement is generally west to east in the Plan Area, based on groundwater elevations (Lindgren *et al.* 2004). Aquifer flow models for the entire Edwards Aquifer show groundwater flows from Uvalde and Medina counties east-northeast eventually discharging at the Comal, Hueco, and San Marcos springs, and numerous other small springs (Kuniansky *et al.* 2001). However, recent tracer studies in northern Bexar County performed by the Edwards Aquifer Authority (EAA) indicate water flows from north to south with very rapid flow velocities (Johnson *et al.* 2009). These observations indicate that flow paths may be more complex than originally thought, and rapid groundwater transport is dominated by karstic conduit flow.

Groundwater Management

Groundwater in Texas is managed through a system of local or regional entities created by the Texas Legislature in Chapter 36 of the Texas Water Code to regulate usage and conservation of groundwater

resources. In the Plan Area, there are six groundwater districts. The Medina Groundwater Conservation District manages groundwater resources of the Trinity and Carrizo aquifers in that county. The Bandera County River Authority and Groundwater Conservation District (Bandera County), Headwaters Groundwater Conservation District (Kerr County), Cow Creek Groundwater Conservation District (Kendall County), and Blanco-Pedernales Groundwater Conservation District (Blanco County) regulate Trinity Aquifer pumping and management in these respective counties. No groundwater conservation district exists in northwestern Comal County to manage that section of the Trinity Aquifer.

The EAA was created in 1993 (implemented in 1996) by the Texas Legislature as a special groundwater district with the purpose to manage and regulate the San Antonio segment of the Edwards Aquifer. The EAA jurisdiction includes all of Medina, Bexar, and southeastern Comal County. The TCEQ requires Edwards Aquifer Protection plans be produced in conjunction with any development within its defined Edwards Aquifer Recharge Zone regulatory area (TCEQ 2009). Components of a plan include a Geological Assessment, Water Pollution Abatement Plan, Sewage Collection System Plan, and above and below ground Storage Tank Facility Plans. Regulations regarding storage tanks also apply over the transition zone of the Edwards Aquifer.

Significant Recharge Features

A significant recharge feature is defined by the 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). Most of the recharge into the Edwards Aquifer occurs where surface water flows over faults, fractures, and karst features (Sharp and Banner 1997). However, the total number of recharge features in the Plan Area is not known.

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).

Groundwater Quality

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 (2013) reported that 3,627 groundwater contamination cases were documented or under enforcement across the state during the 2012 calendar year.

Surface Water

Water Features

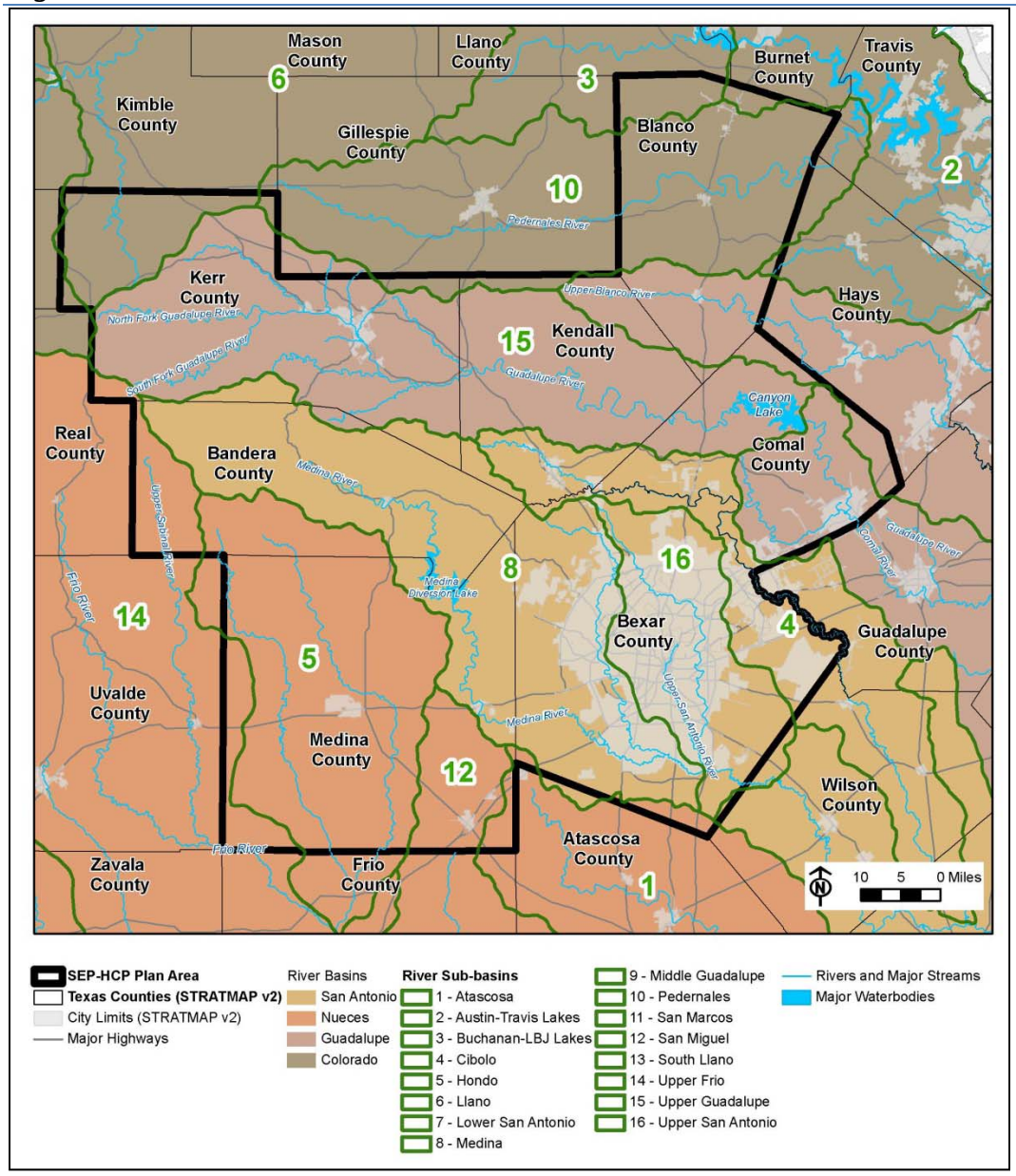
The Plan Area is located within the Texas-Gulf Geographic Region, which is the drainage area of a number of rivers that flow into the Gulf of Mexico and includes parts of Louisiana, New Mexico, and Texas (Seaber *et al.* 1987). According to the National Hydrography Dataset (NHD), parts of four major river basins are present within the Plan Area boundaries: the Colorado, Guadalupe, Nueces, and San Antonio river basins (**Figure 4-2**). Within the Plan Area, these four river basins are further divided into sixteen subbasins: Atascosa, Austin-Travis Lakes, Buchanan-Lyndon B. Johnson Lakes, Cibolo, Hondo, Llano, Lower San Antonio, Medina, Middle Guadalupe, Pedernales, San Marcos, San Miguel, South Llano, Upper Frio, Upper Guadalupe, and Upper San Antonio (**Figure 4-2**).

The Colorado River Basin includes the drainage area for the Colorado River, which is the largest river completely within Texas (TSHA 2010). The Colorado River Basin encompasses approximately 13 percent of the Plan Area and covers portions of Blanco, Kendall, and Kerr counties. Within the Plan Area, five sub-basins occur within the Colorado River Basin: Buchanan-Lyndon B. Johnson Lakes, Austin-Travis Lakes, Llano, South Llano, and Pedernales. The Guadalupe River Basin encompasses approximately 30 percent of the Plan Area and covers portions of Blanco, Comal, Kendall, and Kerr counties. Within the Guadalupe River Basin, the San Marcos, Upper Guadalupe, and Middle Guadalupe sub-basins occur within the Plan Area. The San Antonio River Basin encompasses approximately 35 percent of the Plan Area and covers portions of Bandera, Bexar, Comal, Kendall, Kerr, and Medina counties. Within the Plan Area, four sub-basins (the Cibolo, Upper San Antonio, Lower San Antonio, and Medina sub-basins) occur within the San Antonio River Basin. The Nueces River Basin encompasses approximately 22 percent of the Plan Area and occurs in portions of Bandera, Kerr, and Medina counties. Four sub-basins occur within the Nueces River Basin within the Plan Area: Upper Frio, Hondo, San Miguel, and Atascosa.

Four major rivers (the Guadalupe, Medina, Pedernales, and San Antonio rivers) bisect the Plan Area, and represent approximately 323 miles of waterway within the Plan Area (**Figure 4-2**). These major waterways, and the numerous streams and creeks that feed them, are valuable surface water resources for the Plan Area and support wildlife, riparian habitat, recreational uses, and scenic vistas. Of the four major rivers within the Plan Area, the Guadalupe, Medina, and Pedernales are included in the Nationwide Rivers Inventory (NRI). The NRI is a database of over 3,400 free-flowing river segments in the U. S. that are believed to possess one or more remarkable natural or cultural value that has more than local or regional significance (NPS 2008).

The Guadalupe River begins in western Kerr County from the North and South Fork Guadalupe rivers and runs its course in a southeasterly direction for approximately 230 miles before emptying in San Antonio Bay (TSHA 2010). Approximately 129 miles of this waterway cross through the Plan Area. It provides critical resources in the form of water and electricity to much of the area and it is also a popular tourist and recreation attraction (TSHA 2010). Principle tributaries of the Guadalupe River within the Plan Area include Johnson Creek, Goat Creek, Town Creek, Camp Meeting Creek, Quinlan Creek, Cypress Creek, and Verde Creek. Canyon Dam impounds the Guadalupe River to form Canyon Lake in

Figure 4-2: River Basins and Sub-Basins



Source: TCEQ 2011.

Comal County. According to the NRI, the Guadalupe River from the head of Canyon Lake upstream to the headwaters near Kerrville is rated as the best recreational river within the State of Texas and the second best scenic river (NPS 2008).

The Medina River originates from springs in northwest Bandera County and travels southeast for approximately 116 miles to its mouth at the San Antonio River in southern Bexar County (TSHA 2010). The Medina Dam impounds the Medina River to form Medina Lake in Medina County. The NRI identifies the Medina River from the head of Medina Lake upstream to the State Highway (SH) 173 bridge in Bandera as the fourth most popular river to float in Texas (NPS 2008).

The Pedernales River bisects Blanco County and originates from springs in Kimble County. The river courses northeast for approximately 106 miles to its mouth on Lake Travis in western Travis County. Approximately 45 miles of the Pedernales River occur within the Plan Area. From its confluence with Lake Travis upstream to its headwaters, the Pedernales River is recommended as a potential component of the National Wild and Scenic Rivers System and it is rated as the fifth best recreational river in the state according to the NRI (NPS 2008).

The San Antonio River begins at a group of springs in central Bexar County approximately 4 miles north of downtown San Antonio (TSHA 2010). The river flows southeast for approximately 180 miles before its confluence with the Guadalupe River north of Tivoli, Texas (TSHA 2010). Approximately 34 miles of the San Antonio River occur within the Plan Area. Principal tributaries include Medina River and Cibolo Creek, and two reservoirs impound the river – one for flood control and the other for irrigation (TSHA 2010).

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 includes chemical, physical, and biological criteria. The Texas Surface Water Quality Standards are found in the Texas Administrative Code (TAC) under Title 30, Chapter 307 and establish explicit water quality goals throughout the state for all types of surface water sources.

The state standards are set in an effort to maintain the quality of water in the state, consistent with public health and enjoyment, the protection of aquatic life, and the operation of existing industries and economic development. Surface waters are evaluated for 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.

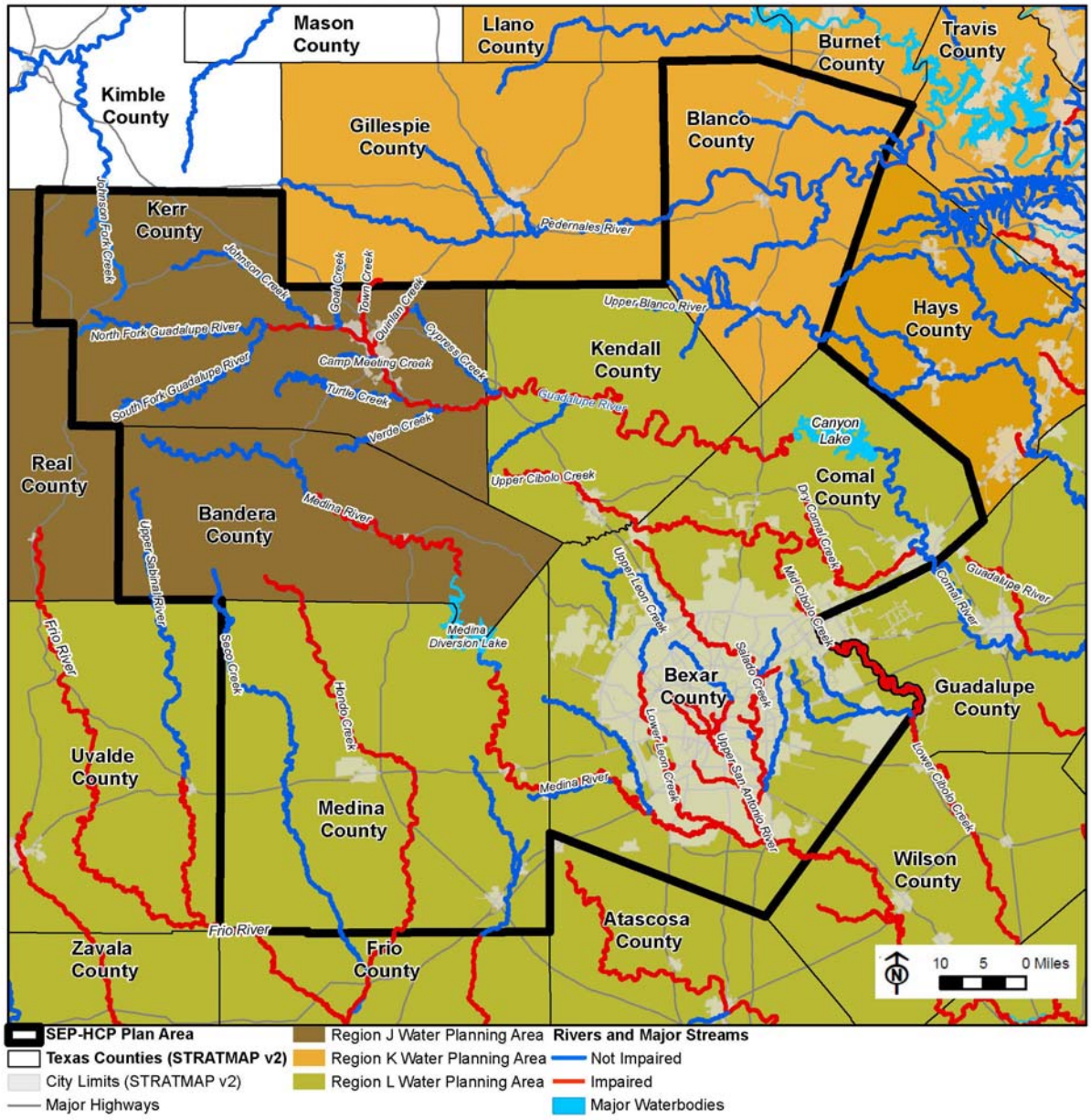
Every two years, the TCEQ assesses water quality across the state and submits a report to the EPA regarding how each body of water meets the state water quality standards. This water quality inventory is the basis of the Clean Water Act 303(d) list, which identifies all impaired water bodies that do not meet the water quality criteria established to support designated uses. The following table lists the impaired waters in the Plan Area from the 2012 Texas Water Quality Inventory and 303(d) List (**Table 0-1**) and **Figure 4-3** illustrates the location of these impaired waters.

Table 0-1: 2012 impaired waters in the Plan Area and their associated impairment category

Water Bodies by County	Bacteria	Impaired Fish Community	Depressed Dissolved Oxygen	Impaired Macrobenthic Community	Mercury or PCBs In Edible Tissue	Chloride
Bandera						
Medina River above Media Lake		X				
Hondo Creek						X
Bexar						
Lower Cibolo Creek	X	X				
Alazan Creek	X					
Lower Leon Creek			X		X	
Upper San Antonio River		X				
Medina River below Medina Diversion Lake	X					
Blanco						
none listed						
Comal						
Upper Cibolo Creek	X					X
Canyon Lake					X	
Dry Comal Creek	X					
Guadalupe River above Canyon Lake	X					
Kendall						
Upper Cibolo Creek	X					X
Kerr						
Guadalupe River above Canyon Lake	X					
Quinian Creek	X					
Town Creek	X					
Medina						
Medina River below Medina Diversion Lake	X					

Source: TCEQ 2012.

Figure 4-3: Impaired Waters in the Plan Area



Source: TCEQ 2012.

Water Use

Communities within the Plan Area, including but not limited to San Antonio, New Braunfels, Boerne, Bandera, Hondo, Johnson City, and Kerrville, use surface water from area reservoirs for municipal, industrial, agricultural, and other non-consumptive uses. The San Antonio River Authority, Nueces River Authority, Guadalupe-Blanco River Authority, Upper Guadalupe River Authority, and Lower Colorado River Authority are the primary wholesale water providers in the Plan Area. River Authorities were established by the Texas Legislature, section 59, Article 16 of the Constitution of Texas, as water conservation and reclamation districts and public corporations. They were given powers to conserve,

store, control, preserve, utilize, and distribute the waters of a designated geographic region for the benefit of the public (TSHA 2010).

Surface water use is publicly owned and governed by the State of Texas, and permits are required from the TCEQ to use surface water with the exception of use for domestic and livestock purposes (Texas Groundwater Protection Committee (TGPC 2008). To facilitate water resources planning, the Texas Water Development Board (TWDB) conducts an annual survey of ground and surface water use by municipal and industrial entities (TCEQ 2011).

According to studies conducted by the TWDB (1998 to 2008) there has been an increase in surface water use by all the counties within the Plan Area with the exception of Bandera County. Blanco, Kendall, and Medina counties are decreasing groundwater use, and Blanco and Medina counties are decreasing water use overall regardless of source. For 2008, surface water use for municipal purposes in Comal County exceeded groundwater use, and Medina County exclusively used groundwater for municipal purposes (TCEQ 2011).

As population numbers continue to increase across the State of Texas, managing and protecting water resources will be one of the most critical issues facing residents. Increased water demand will create challenges in developing effective water plans, adequate regulatory mechanisms, broad conservation measures, and viable economies.

4.3.2 Environmental Consequences

Methodology

For the purposes of analyzing the impacts to water resources, surface water impacts are considered in terms of their effect on the continuation of designated uses, as defined in the Texas Surface Water Quality Standards. Groundwater impacts are analyzed in terms of impacts that could affect the water's ability to meet the state's policy established in section 26.401 of the Texas Water Code, which calls for the protection of groundwater quality for present and potential uses, or affect measurable changes in groundwater availability.

The intensity of impacts to water resources is measured utilizing the following terms and definitions:

Negligible: Impacts to water quality and water availability that are not detectable or well below the thresholds of water quality standards for designated uses. Water quality, water availability, and groundwater recharge will remain within historical baselines and normal variability.

Minor: Detectable impacts to water quality and availability that vary from historical baselines but remain well within the thresholds of water quality standards for designated uses and which will not threaten future uses of surface and groundwater resources.

Moderate: Impacts will be readily apparent with measurable change from historical norms. Water quality, the condition of recharge features, and water availability will not consistently meet the standards for designated uses but will not be permanently impaired for future use such as a permanent degradation of water quality or the complete loss of groundwater recharge or surface water features. Moderate impacts will likely require mitigation measures that will have a reasonable likelihood of successfully offsetting the adverse impacts.

Major: Like moderate impacts, major impacts are also readily apparent impacts with measurable change from historical baseline conditions. However, for impacts to be considered major, water quality, the condition of recharge features, and water availability will frequently or permanently exceed the standards for designated uses and could result in permanent impairment. Major impacts will require extensive mitigation measures, although they may not have a reasonable likelihood of successfully offsetting the adverse impacts.

No Action Alternative

Under the No Action Alternative the Service will not issue an ITP, Bexar County and the City of San Antonio will not implement the SEP-HCP, and land development projects in the Plan Area will follow the standard procedures for complying with the ESA. The No Action Alternative represents the status quo whereby land development projects will also be subject to the existing federal and state regulations that protect ground and surface water quality and manage the availability of the state's water resources.

Impacts to water resources resulting from the No Action Alternative are projected based on the historic and forecasted population growth within the Plan Area. In 2010 the Plan Area was home to almost 2 million people and is projected to increase to a forecasted 2.8 to 3.2 million people by 2040 (WDA 2010a, TSDC 2009). Based on the demographic trends noted between 2000 and 2010, the more rural counties in the Plan Area, particularly Comal and Kendall counties, have seen the greatest percentage of growth (US Census Bureau 2010). As the Plan Area grows, forest, shrublands, and grasslands will continue to be converted to developed land uses to support the increasing need for residences, places of work, and infrastructure and utilities. Between 1992 and 2001 the Plan Area has witnessed a conversion of over 40,000 acres of land to urban uses, primarily from forest and grassland/shrub cover (USGS 2003). And between 2010 and 2040 it is anticipated that almost 7,800 acres of land will be converted to urban uses each year (WDA 2010b). Construction activities associated with land development also include grading soil, soil compaction, altering the existing topography, paving surfaces, and constructing buildings and other structures. A total of 234,000 acres in the SEP-HCP planning horizon will experience construction activities with or without the SEP-HCP.

Vegetation anchors soil and filters the runoff that flows across it, allowing sediment to settle out and removing some contaminants. The removal of vegetation can increase the velocity of the overland flow of water and can increase the probability of erosion and therefore the amount of sediment likely to be found in stormwater runoff. Removal of vegetation also eliminates the natural water filtration that plants provide; vegetation removes some of the contaminant from stormwater before it enters water bodies or recharge features. Stormwater runoff from urbanized areas generally has higher concentrations of pesticides, volatile organic compounds, nitrates, trace elements, and sediment when compared to undeveloped rangeland. The higher concentrations are partially a result of more contaminants in an urban environment and in part due to the conversion of vegetation and water resources to impervious cover (Ging 1999, Bush *et al.* 2000).

Construction activities could also result in the closure of recharge features with impervious cover and reduce the quantity of infiltration of precipitation into the soil and groundwater recharge. While TCEQ guidelines have provisions for protecting recharge features, which could reduce the adverse impacts to recharge features, a project-specific review could result in the closure of karst features in an effort to protect groundwater quality. The geologic formation of the Edwards Aquifer makes it particularly susceptible to contamination. Approximately 80 percent of the recharge in the Edwards Aquifer occurs

from losing streams (streams that contain faults, fractures, and karst features connected to the aquifer) (Sharp and Banner 1997). Bush *et al.* 2000 found a correlation between the quality of recently recharged groundwater in the urbanized areas of the Edwards and the quality of surface water in the same areas.

With respect to regulating impacts to water resources, future land development projects in the Plan Area will 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 the Plan Area 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 and enforces minimum setbacks for development near recharge features. The Corps regulates dredge and fill into waters of the U.S. under section 404 of the *Clean Water Act*. These measures, and 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 ESA authorizations related to these projects will also occur under the No Action Alternative (i.e., individual ESA section 10(a)(1)(B) permits or section 7 consultations). Even with these programs, 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, will likely be minor to moderate under the No Action Alternative because they would be detectable but still within the thresholds of water quality standards for designated uses and not threatening to future uses of surface water and groundwater resources.

Proposed SEP-HCP Alternative

The SEP-HCP will not substantially affect the amount, timing, or location of land development over the next 30 years, with the exception of preventing future development from occurring in areas that are designated as preserve. Therefore, the adverse impacts to water resources that will be expected under the Proposed SEP-HCP Alternative will be similar to those described for the No Action Alternative. Future land development projects under this alternative, as with the No Action Alternative, will be expected to comply, on a case-by-case basis, with existing local, state, and federal water quality regulations, standards, and programs.

The Proposed SEP-HCP Alternative is expected to result in greater beneficial impacts to water resources than the No Action Alternative because a greater level of land conservation would occur. It is anticipated that approximately 30,130 acres of undeveloped land containing habitat for the Covered Species will be permanently protected under the Proposed SEP-HCP Alternative. Protection of natural/native vegetation will protect surface and groundwater resources by conserving the natural process whereby stormwater runoff is filtered and flood waters are absorbed for aquifer recharge. Conservation of consolidated, large tracts of open space in the Plan Area is likely to beneficially impact natural streams and their riparian corridor as well as groundwater recharge features, assuming that the selected preserve land contains water resources.

As described above, natural buffers along creeks and streams filter pollutants and absorb flood waters. These vegetated areas will slow down water and allow some pollutants to settle out of the stormwater

before they reach surface waters and groundwater. The protection of thousands of acres of natural vegetation in the Plan Area under the Proposed SEP-HCP Alternative will protect surface and groundwater resources by conserving the natural ecological processes that filter stormwater runoff and absorb flood waters for aquifer recharge. Therefore, the protection of natural vegetation in the SEP-HCP preserve system will likely yield some indirect beneficial impacts to water resources, compared to the No Action Alternative.

Overall, implementation of the SEP-HCP will result in more assured long-term protection of the water resources contained within the preserve system. Despite the conservation achieved with the Proposed SEP-HCP Alternative, it is anticipated that almost 7,800 acres of land will be converted to urban uses each year between 2010 and 2040 (WDA 2010b). As such, the Proposed SEP-HCP Alternative would result in negligible to minor beneficial effects to the water resources in the Plan Area compared to the No Action Alternative because these impacts would be either undetectable or well below the thresholds of water quality standards for designated uses, whereas minor impacts would be those that are detectable but are still within the thresholds of water quality standards for designated uses and not threatening to future uses of surface and groundwater resources.

10% Participation Alternative

Like the No Action Alternative, the 10% Participation Alternative will 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 will be similar to the impacts described for the No Action Alternative. Future land development projects under this alternative will be expected to comply, on a case-by-case basis, with existing local, state, and federal water quality regulations, standards, and programs.

The 10% Participation Alternative would create a 7,390-acre preserve system which is one-quarter of the conserved size of the Proposed SEP-HCP Alternative. As mentioned above, the conservation of natural landscapes and vegetation along creeks and streams would help improve water quality by filtering pollutants from stormwater and absorbing flood waters. While some habitat conservation will occur under the No Action Alternative as the result of individual ESA compliance actions, the distribution and size of the preserve under the 10% Participation Alternative will likely create a more effective buffers for streams than will be achieved with fewer, smaller, and more scattered protected areas under the No Action Alternative. The difference will be small however, as the total area that will be conserved under this alternative will be small compared to the total size of the area of potential effect. Therefore, the beneficial impacts of the 10% Participation Alternative on water resources will likely be negligible compared to the No Action Alternative because they would not be detectable or they would be well below the thresholds of water quality standards for designated uses.

Single-County Alternative

The Single-County Alternative will 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 will be similar to the impacts described for the No Action Alternative. Future land development projects under this alternative will 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 Single-County Alternative and the No Action Alternative is the establishment and long-term management of a 16,014-acre preserve system. Of the Action Alternatives, the Single-County Alternative is unique in that all of the preserve system will be located within Bexar County and up to 10 miles outside of Bexar County; whereas all other alternatives could preserve land throughout the seven-county Plan Area. Like the other Action Alternatives, the water resources that are located within the preserve system of the Single-County Alternative would benefit from the conservation of preserves of natural landscapes and vegetation along creeks and streams greater than the No Action Alternative. Unlike the other Action Alternative, these benefits will be primarily focused within Bexar County. While some habitat conservation will occur under the No Action Alternative as the result of individual ESA compliance actions, the extent of these individual preserves will likely be less than the assured protection of 16,014 acres under the Single-County Alternative. The beneficial impacts of the Single County Alternative on water resources will likely be negligible to minor compared to the No Action Alternative because impacts would be within the thresholds of water quality standards for designated uses and not threatening to future uses of surface and groundwater resources.

Increased Mitigation Alternative

The 33,098 acres of authorized incidental take of Covered Species habitat under the Increased Mitigation Alternative will have similar adverse effects to both surface water and groundwater, as described for the No Action Alternative because development activities under both alternatives must comply with existing local, state, and federal water quality regulations, standards, and programs. Therefore, the potential adverse impacts of the Increased Mitigation Alternative will be similar to those expected under the No Action Alternative.

The establishment and long-term management of a 43,741-acre preserve system, as proposed under this alternative, will yield beneficial impacts to water resources in the Plan Area similar to those described for the other Action Alternatives. Of the Action Alternatives, the Increased Mitigation Alternative would protect the most amount of land in its preserve system; and therefore, it has the potential to have the greatest benefits to water resources (provided that water resources are located within the preserve system). Therefore, the Increased Mitigation Alternative could have a minor to moderate benefit to water resources in the Plan Area, compared to the No Action Alternative, due to the increased size of the expected preserve system.

4.4 VEGETATION

4.4.1 Affected Environment

4.4.1.1 Environmental Protection Agency Ecoregions

The EPA has delineated ecoregions within the United States to serve as a framework for the management of environmental resources. The boundaries of the ecoregions are based on common ecosystem characteristics, including the type, quality and quantity of environmental resources. Additionally, there are subregions within each ecoregion. The Plan Area includes parts of four ecoregions (Edwards Plateau, South Texas Plains, East Central Texas Plains and Texas Blackland Prairie) and six subregions (**Table 0-2** and

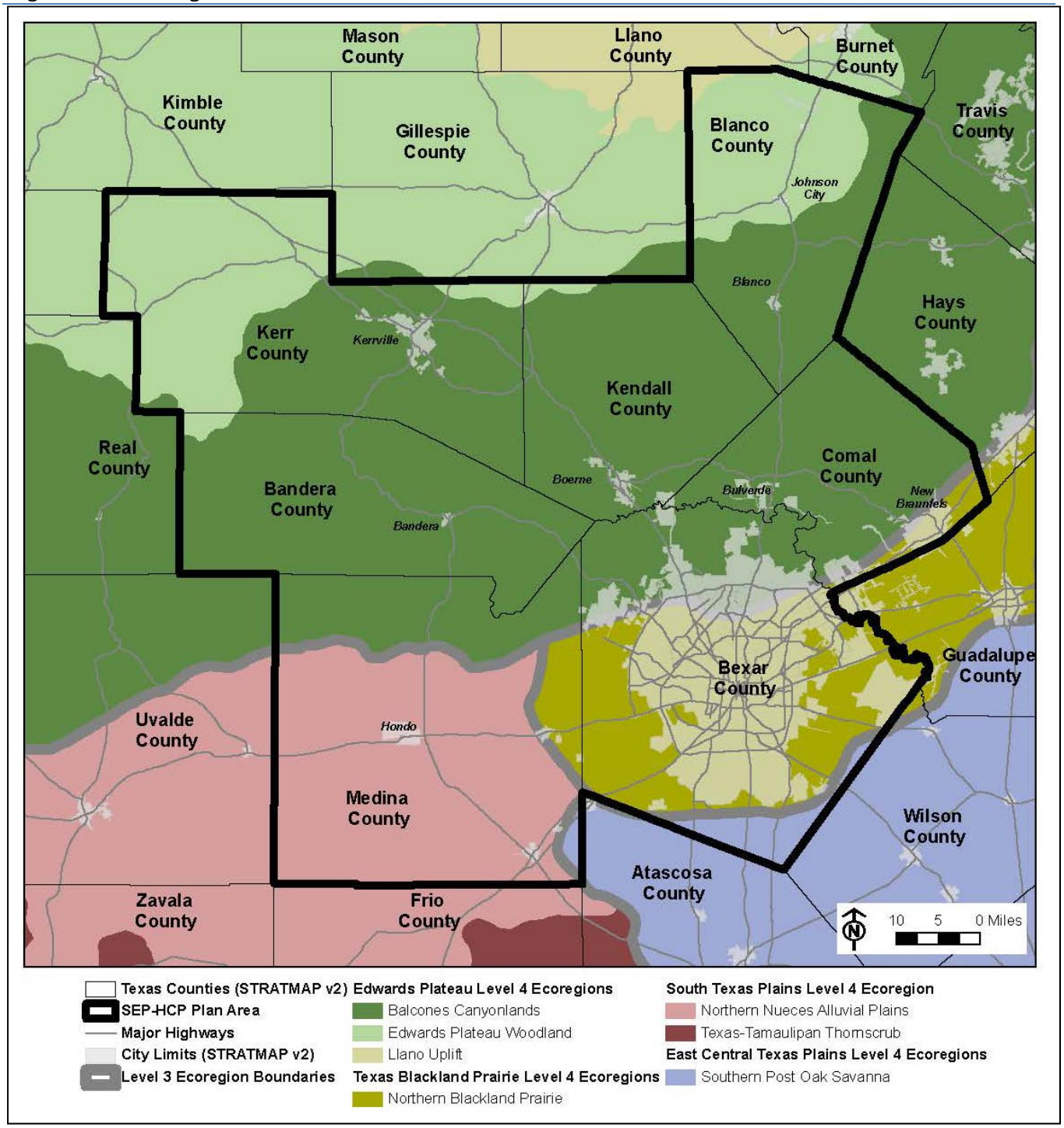
Figure 4-4)**.**

Table 0-2: Ecoregions within the Plan Area

Subregion	Acres within the Plan Area	% of Plan Area
Balcones Canyonlands	2,226,318	54.0%
Northern Blackland Prairie	641,541	16.0%
Northern Nueces Alluvial Plains	598,310	14.0%
Edwards Plateau Woodlands	580,093	14.0%
Southern Post Oak Savanna	74,334	2.0%
Llano Uplift	7,373	0.2%

Source: Griffith *et al.* 2004.

Figure 4-4: Ecoregions in the SEP-HCP Plan Area



Source: Griffith *et al.* 2004.

The Llano Uplift subregion is a basin that is up to 1,000 feet below the surrounding limestone escarpment and is distinguished from other parts of the Edwards Plateau by areas of exposed granite. Soils in this subregion tend to be acidic, unlike the alkaline soils of the Edwards Plateau Woodland subregion. Typical woodland vegetation on the Llano Uplift includes plateau live oak (*Quercus virginiana*), honey mesquite (*Prosopis glandulosa*), post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), cedar elm (*Ulmus crassifolia*), and (occasionally) black hickory (*Carya texana*). Common grasses of this region include little bluestem (*Schizachyrium scoparium*), yellow indiangrass (*Sorghastrum nutans*), silver bluestem (*Bothriochloa saccharoides*), and switchgrass (*Panicum virgatum*). Drier areas of the Llano Uplift may include species more characteristics of west Texas, such as catclaw mimosa (*Acacia greggii*) and soaptree yucca (*Yucca elata*). The Llano Uplift typically lacks Ashe juniper (*Juniperus ashei*) and Spanish oak (*Quercus falcate*), except within areas where limestone outcrops (Griffith *et al.* 2004). There are 7,373 acres of Llano Uplift in the Plan Area.

The Northern Blackland Prairie subregion of the Texas Blackland Prairie ecoregion accounts for 641,541 acres of the Plan Area. This subregion is characterized by rolling to nearly level, deep and productive soils. Historically, this subregion was dominated by large expanses of grasses; however, most of the native prairie habitat has been converted to cropland, non-native pasture, and developed land uses. Common grasses include little bluestem, big bluestem (*Andropogon gerardii*), yellow indiangrass, and tall dropseed (*Sporobolus compositus*), with lowland sites represented by eastern gamagrass (*Tripsacum dactyloides*) and switchgrass. Common forbs species include asters, prairie bluet, prairie clovers, and blackeyed susan. Occasional woodland species are found along riparian corridors, such as Shumard oak (*Quercus shumardii*), sugar hackberry (*Celtis laevigata*), elm (*Ulmus* spp.), ash (*Fraxinus* spp.), eastern cottonwood (*Populus deltoides*), and pecan (*Carya illinoinensis*) (Griffith *et al.* 2004).

The Northern Nueces Alluvial Plains, a subregion of the Southern Texas Plains ecoregion, covers 598,310 acres of the Plan Area. The characteristics of the Northern Nueces Alluvial Plains are influenced by streams draining from the Balcones Canyonlands subregion. Alluvial fans and alluvial plains deposits are common features of the landscape and soils in this subregion are generally very deep. Typical vegetation in the Northern Nueces Alluvial Plains includes mesquite-live oak-bluewood parks within the northern part of the subregion and mesquite-granjeno parks in the southern part. These parks are interspersed with grasslands and scattered honey mesquite, plateau live oak, and other trees in areas with deep soils and short brush, and guajillo (*Acacia berlandieri*), blackbrush (*Acacia rigidula*), elbowbush (*Forestiera pubescens*), and kidneywood (*Eysenhardtia texana*), in areas with shallower soils. Some floodplain forests may include hackberry, plateau live oak, pecan, cedar elm, black willow (*Salix nigra*), and eastern cottonwood along the banks. Common grasses in this subregion include little bluestem, sideoats grama (*Bouteloua curtipendula*), lovegrass tridens (*Tridens eragrostoides*), multiflowered false rhodesgrass (*Trichloris pluriflora*), Arizona cottontop (*Digitaria californica*), plains bristlegrass (*Setaria vulpiseta*), and green sprangletop (*Leptochloa dubia*). Many areas in the Northern Nueces Alluvial Plains are used to grow crops, which are frequently irrigated (Griffith *et al.* 2004).

The southeastern corner of the Plan Area is represented by the Southern Post Oak Savanna subregion of the East Central Texas Plains ecoregion. There are approximately 74,334 acres of Southern Post Oak Savanna in the Plan Area. This area is a mosaic of post oak savanna, improved pasture, and rangeland. Some areas in the southern portion of this subregion are being invaded by mesquite, while other areas have a thick understory of yaupon (*Ilex vomitoria*) and eastern red cedar (*Juniperus virginiana*) (Griffith *et al.* 2004).

Texas Parks and Wildlife Department Vegetation Map

In 1984, TPWD mapped vegetation communities within Texas (McMahan *et al.* 1984). While somewhat outdated, *The Vegetation Types of Texas* still provides a useful summary of the general vegetation communities across the state. McMahan *et al.* (1984) identified 13 vegetation types in the Plan Area including forests, woods, parks, brush, grasslands, crops, lakes, and urban lands (**Table 0-3**).

Over the last 10 years, conversion to grassland or shrubland vegetation was the most common fate of lost forest cover across the Plan Area, particularly outside of Bexar County. Conversion of forest cover to other, non-urban, land cover types accounted for approximately 87 percent of the forest cover loss across the Plan Area, and as much as 97 percent of the loss occurred in Blanco, Bandera, Kerr, Kendall and Medina counties (National Land Cover Dataset 1992 through 2001).

Table 0-3: Vegetation Types within the Plan Area

Vegetation Type	Acres within the Plan Area	% of Plan Area
Live Oak - Ashe Juniper Parks	1,256,474	30.4%
Live Oak - Ashe Juniper Woods	796,302	19.3%
Live Oak - Mesquite - Ashe Juniper Parks	791,526	19.2%
Crops	565,781	13.7%
Mesquite - Live Oak - Bluewood Parks	190,004	4.6%
Mesquite - Granjeno Woods	163,271	4.0%
Urban	159,376	3.9%
Post Oak Woods, Forest, and Grassland	76,918	1.9%
Mesquite - Blackbrush Brush	41,105	1.0%
Live Oak - Mesquite Parks	34,646	0.8%
Post Oak Woods and Forest	23,969	0.6%
Lake	17,296	0.4%
Pecan - Elm Forest	11,300	0.3%

Source: McMahan *et al.* 1984.

4.4.2 Environmental Consequences

Methodology

The implementation of any of the Action Alternatives will have an effect on vegetation such that potentially suitable habitat for the Covered Species could be lost or modified by authorizing incidental take while other suitable habitat for the Covered Species could be conserved and managed in perpetuity through conservation.

The intensity of impacts to vegetation are measured based on the definition of the following terms:

Negligible: Individual native plants may be affected however measureable changes to plant community size, integrity or continuity will not occur.

Minor: Measurable impacts to native plants will occur however will be localized to a small percentage of the native plant community. The integrity and continuity of the native plant community will not be adversely affected.

Moderate: A relatively large percentage of the native plant community will experience measureable change in terms of species composition, vegetation structure, or habitat quality for native wildlife. Moderate impacts will likely require mitigation

measures and will have a reasonable likelihood of successfully offsetting the adverse impacts.

Major: Substantial changes to large portions of native vegetation communities will be apparent. Major impacts will require extensive mitigation measures that may not have a reasonable likelihood of successfully offsetting the adverse impacts.

No Action Alternative

As previously described, approximately 241,152 acres in the Plan Area will be developed with or without the SEP-HCP 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, most of the construction is expected to occur in northern Bexar County, southwestern Comal County and eastern Medina County. It can be assumed that the new development will require clearing of vegetation prior to construction and alteration of vegetation types, via landscaping, after construction is complete. Soil structure is important because it determines the ability of a soil to hold and conduct water, nutrients, and air necessary for plant root activity. Increased urbanization results in soil compaction which reduces its efficiency of the soil to provide a health environment for plants. In dry years, soil compaction can lead to stunted, drought-stressed plants due to decreased root growth. Soil compaction in the surface layer can increase runoff, thus increasing soil and water losses (University of Minnesota, 2001).

The fragmentation of native vegetation communities by land development will facilitate the invasion and establishment of non-native plants. Areas of native vegetation will be replaced with impervious cover and landscaping that is frequently composed of non-native vegetation, such as turfgrass and ornamental plants. Also, the introduction of non-native species (competitors, diseases) in the Plan Area will degrade the surrounding native vegetation communities. Additionally, under the No Action Alternative the conversion of forest cover to grassland or shrubland vegetation would be expected to continue at its current rate over the next 30 years, resulting in the reduction in wildlife habitat.
With the exception of certain vegetation communities that afford habitat for species listed under the ESA, impacts to vegetation communities are generally not regulated under federal or state law. Under the No Action Alternative, the impacts of development to vegetation that provides habitat for endangered species will 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 will be conserved on a case-by-case basis and result in negligible beneficial impacts to vegetation in the Plan Area. Overall, however, moderate adverse impacts to vegetation will result from the No Action Alternative because of soil compaction and a relatively large percentage of the native plant community would be anticipated to experience measureable change in terms of species composition, vegetation structure, or habitat quality for native wildlife.

Proposed SEP-HCP Alternative

The Proposed SEP-HCP Alternative will not substantially affect the amount, timing, or location of land development over the next 30 years, with the exception of preventing future development from occurring in areas that are designated as preserve. Therefore, the adverse impacts to vegetation associated with land development under the Proposed SEP-HCP Alternative will be similar to those described for the No Action Alternative.

Compared to the No Action Alternative, the Proposed SEP-HCP Alternative will be expected to result in a greater level of habitat conservation due to the 31,031 acres of undeveloped land containing habitat for the Covered Species that will be permanently protected under this alternative. Preserve land will be primarily forest and shrubland vegetation communities used by the GCWA and BCVI. It is likely that this level of open space conservation will not occur under the No Action Alternative. As a result, the Proposed SEP-HCP Alternative could have a moderate benefit to vegetation resources in the Plan Area, compared to the No Action Alternative, because a larger percentage of the native plant community will be preserved.

10% Participation Alternative

The 10% Participation Alternative will 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 vegetation resulting from anticipated land development will be similar to the impacts described for the No Action Alternative.

The primary difference between the 10% Participation Alternative and the No Action Alternative is the establishment and long-term management of a 7,390-acre preserve system which will include approximately 5,250 acres of GCWA habitat, 1,390 acres of BCVI habitat, and 750 acres of karst lands. While some habitat conservation will occur under the No Action Alternative as the result of individual ESA compliance actions, the extent of these individual preserves will likely be less than the assured protection of 7,390 acres under the 10% Participation Alternative. The concentration of preserve land with more assured protection and guided management is likely to create a more effective protection for vegetation contained within the 7,390-acre preserve system than will likely be achieved with fewer, smaller, and more scattered protected areas under the No Action Alternative. Thus, these larger blocks of conserved native vegetation protected from development by the SEP-HCP will be more likely to yield benefits to vegetation than the mitigation measures that will result from project-by-project authorizations with the Service. The difference will be small, however, as the total area that will be conserved under this alternative will be small compared to the total size of the area of potential effect. Therefore, the beneficial impacts of the 10% Participation Alternative on vegetation will likely be only minor because they are likely to be localized to a small percentage of the native plant community.

Single-County Alternative

The Single-County Alternative will not have a significant influence on the amount, timing, or location of land development anticipated over the next 30 years. The potentially adverse impacts to vegetation resources resulting from anticipated land development will be similar to the impacts described for the No Action Alternative.

The primary difference between the Single-County Alternative and the No Action Alternative is the establishment and long-term management of a preserve system of up to 16,014 acres. While some habitat conservation will occur under the No Action Alternative as the result of individual ESA compliance actions and other park and open space initiatives, the extent of these individual preserves will likely be less than the assured protection of 16,014 acres under the Single County Alternative. Larger blocks of conserved native vegetation protected from development by the Single-County Alternative will be more likely to yield benefits to the ecosystem than the mitigation measures that likely will result from project-by-project authorizations with the Service under the No Action Alternative. Compared to the other Action Alternatives, all of the preserve lands proposed for the Single-County Alternative will be concentrated closer to the urbanized areas within Bexar County and, therefore, the

threat of invasion and establishment of non-native plants as a result of exposure to adjacent land uses could be higher. Overall, the beneficial impacts of the Single County Alternative on vegetation will likely be minor to moderate compared to the No Action Alternative because they could range from being localized to a small percentage of the native plant community in smaller preserves to a larger preserve that would protect native vegetation and more readily buffer it against change.

Increased Mitigation Alternative

The Increased Mitigation Alternative will not have a large influence on the amount or timing of land development anticipated over the next 30 years. Land development under the Increased Mitigation Alternative will have similar adverse effect as the No Action Alternative. Overall however the potential adverse impacts on vegetation will be reduced through the protection of habitat.

The establishment and long-term management of up to 43,741-acre preserve system, as proposed under this alternative, will yield beneficial impacts to vegetation in the Plan Area. There will be less fragmentation of native vegetation communities by land developments which facilitate the invasion and establishment of non-native plants. Therefore, the potential beneficial impacts of the Increased Mitigation Alternative will be greater than those expected under the No Action Alternative. Like the Single-County Alternative, the Increased Mitigation Alternative includes a requirement that some of the preserve land be located within or adjacent to Bexar County. For the Increased Mitigation Alternative, the preserves for the BCVI will be mostly located in rural areas of the Plan Area; whereas, the majority (60 percent) of the GCWA habitat preserve will be contained within five miles of Bexar County. The more urbanized land uses found in Bexar County elevates the risk of invasion and establishment of invasive plant species within these preserve lands. However, this alternative will likely contain larger areas of contiguous, undeveloped land throughout the Plan Area than the No Action Alternative. The Increased Mitigation Alternative would have a moderate benefit to vegetation resources in the Plan Area compared to the No Action Alternative because it would protect large, contiguous areas that would maintain habitat characteristics and discourage invasive species through buffering.

4.5 GENERAL WILDLIFE

4.5.1 Affected Environment

The Plan Area crosses parts of six different ecological subregions, as described by the EPA (Griffith *et al.* 2004). These six distinct ecological subregions include the following communities: Balcones Canyonlands, Edwards Plateau Woodland, Northern Blackland Prairie, Llano Uplift, Northern Nueces Alluvial Plains, and Southern Post Oak Savanna.

Wildlife communities associated with these ecological subregions are as diverse as the ecological subregions themselves. A total of approximately 520 species of amphibians, reptiles, mammals, and birds make up the various vertebrate wildlife communities within the Plan Area (Dixon 2000, Schmidly 1994, Lockwood and Freeman 2004). Wildlife communities within the Balcones Canyonlands subregion are the most diverse, with approximately 95 percent of the total wildlife species within the Plan Area occurring within this region. However, over the past decade, conversion of forested land cover to other non-urban land cover types, such as grassland or shrubland, accounted for approximately 87 percent of the forest cover loss across the Plan Area, and most of this loss occurred in Blanco, Bandera, Kerr, Kendall and Medina counties (National Land Cover Dataset 1992 through 2001).
The 2005 Texas Wildlife Action Plan prepared by TPWD identified 301 native wildlife species of conservation concern that may occur in the Edwards Plateau ecoregion (TPWD 2005). These lists identify species with low or declining populations that are important to the health and diversity of the

State's wildlife resources. Many species would be expected to benefit from the conservation actions provided for by the SEP-HCP (**Table 0-4**).

Table 0-4: Native Vertebrate Wildlife Communities by Taxon and Ecological Region within the Plan Area (Species Diversity)

Taxon	Plan Area	Balcones Canyonlands	Edwards Plateau Woodlands	Llano Uplift	Northern Blackland Prairies	Northern Nueces Alluvial Plains	Southern Post Oak Savanna
Amphibians	33	33	25	22	30	21	28
Reptiles	79	77	65	63	76	72	74
Mammals	76	72	71	56	65	60	63
Birds	332	311	289	276	303	263	298
Total	520	493	450	417	474	416	463

Source: SEP-HCP 2013.

In addition to the Covered Species, other special status species occur in the Plan Area. Seventeen Voluntarily Conserved Species are addressed in the SEP-HCP including one mammal, six reptiles, one amphibian, three mollusks, and six plants (**Table 0-5**). The Voluntarily Conserved Species occur in habitats that are generally associated with areas used by the Covered Species. Habitats for the Voluntarily Conserved Species may be incidentally taken by the Covered Activities in the Enrollment Area or protected by preserve acquisitions for the Covered Species. None of Voluntarily Conserved Species are proposed to be covered for incidental take in the SEP-HCP, but some may benefit from the conservation measures described in the SEP-HCP. The SEP-HCP conservation program will consider the protection and management of habitats for these species as secondary priorities during the evaluation of potential preserve acquisitions and in preserve management plans. However, the conservation needs of the Covered Species will take precedence over the needs of the Voluntarily Conserved Species.

Table 0-5: Voluntarily Conserved Species

Common Name	Scientific Name	Taxa	Status	Basic Habitat Type
Cave myotis bat	*Myotis velifer*	Mammal	Non-listed	Roosts in clusters of up to thousands of individuals in a variety of natural and man-made structures; winters in limestone caves.
Cagle's map turtle	*Graptemys caglei*	Reptile	State Threatened	Guadalupe River system; short stretches of shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom.
Texas tortoise	*Gopherus berlandieri*	Reptile	State Threatened	Open brush with a grass understory; when inactive occupies shallow depressions at base of bush or cactus.
Indigo snake	*Drymarchon corais*	Reptile	State Threatened	Thornbush-chaparral woodlands of south Texas, in particular dense riparian corridors; requires moist microhabitats, such as rodent burrows, for shelter.
Spot-tailed earless lizard	*Holbrookia lacerata*	Reptile	Non-listed	Moderately open prairie brushland; fairly flat areas free of vegetation or other obstructions, including disturbed areas.

Common Name	Scientific Name	Taxa	Status	Basic Habitat Type
Texas horned lizard	*Phrynosoma cornutum*	Reptile	State Threatened	Open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees.
Texas garter snake	*Thamnophis sirtalis annectens*	Reptile	Non-listed	Wet or moist microhabitats are conducive to the species occurrence, but are not necessarily restricted to them.
Eurycea Salamanders	*Various species*	Amphibian	State & Federally Threatened	Karst-dependent; associated with aquifers, spring outfalls and spring runs.
Golden orb	*Quadrula aurea*	Mollusk	State Threatened & Petitioned for Federal Listing	Flowing waters of moderate-sized streams and rivers of the San Antonio, Guadalupe, Colorado, Brazos, Nueces, and Frio River systems.
Texas pimpleback	*Quadrula petrina*	Mollusk	State Threatened & Petitioned for Federal Listing	Flowing water of moderate-sized streams and small rivers; historically known from the San Antonio and Guadalupe River systems; not currently known to occur in the Plan Area.
Texas fatmucket	*Lampsilis bracteata*	Mollusk	State Threatened & Petitioned for Federal Listing	Flowing water of moderate-sized streams and small rivers in the San Antonio, Guadalupe, and Colorado River systems.
Tobusch fishhook cactus	*Sclerocactus brevihamatus ssp tobuschii*	Plant	Federally Endangered & State Endangered	Open areas within a mosaic of oak-juniper woodlands; sites are usually open with only herbaceous cover.
Big red sage	*Salvia penstemonoides*	Plant	Petitioned for Federally Endangered	Associated with seeps and creeks within steep limestone canyons; occasionally on clayey to silty soils of creek banks and terraces.
Bracted twistflower	*Streptanthus bracteatus*	Plant	Non-listed	Oak juniper woodlands over limestone and associated openings; on steep to moderate slopes and in canyon bottoms.
Longstalk heimia	*Nesaea longipes*	Plant	Non-listed	Moist alkaline or gypsiferous clayey soils along non-shaded margins of wetlands; moderately alkaline clay soils along perennial streams and in sub-irrigated wetlands; sparingly found on terraces of spring-fed streams in grassland.
Correll's false dragon-head	*Physostegia correllii*	Plant	Non-listed	Wet, silty clay loams on streamsides, in creek beds, irrigation channels and roadside drainage ditches.
Canyon rattlesnake-root	*Prenanthes carrii*	Plant	Non-listed	Rich humus soils over limestone in upper woodland canyon drainages; typically near springs in deep soils around the springs and on limestone shelves or honeycomb rock.

Source: SEP-HCP EIS Team 2011.

Texas Wildlife Action Plan

The 2005 Texas Wildlife Action Plan 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 Action Plan identifies a list of species with low or declining populations that are important to the health and diversity of the State's wildlife resources; there are 514 native wildlife species of conservation concern that may occur in the SEP-HCP Plan Area. This Action is used by the TPWD to prioritize and plan wildlife management and conservation efforts.

Potential Impacts to Wildlife from Land Development Activities

Impacts to wildlife may 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.

Impacts to the over 520 species listed in the Plan Area will 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. Land development impacts natural environments in several ways, such as replacing native vegetation with buildings, pavement, and other man-made structures; decreasing the amount of continuous open-space (e.g., fragmentation); and increasing vegetational disturbance, erosion, and soil compaction (Bradley 1995). 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). Physical changes to the natural landscape, and possible alteration in predator or competitor interactions, will result from increased urbanization. Most animals in urban areas 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. Some 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 birds to some degree, they provide no protection to the habitat required for their survival. In general, the natural composition and stability of native wildlife communities will 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). 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, projected future land development activities have the potential to adversely impact wildlife populations through habitat changes, introduction of non-native species, and other alterations to the natural balance of native wildlife species within the SEP-HCP Plan Area.

4.5.2 Environmental Consequences

Methodology

In addition to the Covered Species, other wildlife species can be found to occupy the same habitat in the Plan Area. Loss or modification of habitat as a result of an ITP will also adversely affect wildlife while conservation of other areas of habitat for the Covered Species will beneficially affect wildlife.
The intensity of potential impacts to wildlife is measured using the following definitions:

Negligible: No measureable impacts to self-sustaining wildlife communities will be detected.

Minor: Some measureable changes such as slight shifts in species composition or population numbers will occur but will be localized within a small area. The integrity and continuity of the wildlife community will not be adversely affected.

Moderate: Measureable changes in species composition, individual species abundance, or distribution of a particular self-sustaining native wildlife community will occur over a relatively large area. Moderate impacts likely will require mitigation measures and will have a reasonable likelihood of successfully offsetting the adverse impacts.

Major: Substantial changes of species composition, individual species abundance, or distribution of a particular self-sustaining native wildlife community will be apparent over a large area. Major impacts will require extensive mitigation measures that may not have a reasonable likelihood of successfully offsetting the adverse impacts.

No Action Alternative

As previously described, a total of 241,152 acres in the Plan Area will experience construction activities with or without the SEP-HCP over the next 30 years. The precise location, magnitude, and nature of specific activities associated with future commercial, residential, and other types of development cannot be predicted; however, most of the new development (55 percent) is predicted occur in Bexar County followed by Comal County (24.1 percent), and Medina County (10.4 percent). The areas anticipated for the greatest amount of development generally correspond to the SEP-HCP Enrollment Area. New development will include clearing vegetation prior to construction which will alter the processes that maintain the balance in native wildlife communities, resulting in adverse impacts to self-sustaining native wildlife communities. The No Action Alternative will not increase these impacts, but this condition will continue to degrade and 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.

Under the No Action Alternative, development on land that provides habitat for endangered species may be mitigated on a case-by-case basis, but most land development that occurs outside of endangered species habitat will likely commence without conservation of open spaces as mitigation for impacts. As ESA-related mitigation will be specific to the affected listed species, these lands will 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 will generally result in negligible beneficial impacts to native self-sustaining wildlife communities because they will likely not be measureable.

Proposed SEP-HCP Alternative

The Proposed SEP-HCP Alternative will not be expected to substantially affect the amount, timing, or location of land development over the next 30 years, so impacts to wildlife communities will also be similar to the No Action Alternative, with the exception of preventing future development from occurring in areas that are designated as preserve. Although many wildlife species thrive in urbanized environments, future development pressure will cause most wildlife communities currently present in the Plan Area to experience a decrease in habitat and likely decline in population sizes. Therefore, consolidation of mitigation lands in the Proposed SEP-HCP Alternative will likely result in moderately beneficial impacts on many wildlife species, although the true impacts of the proposed SEP-HCP on wildlife communities will be tied to the size and location of proposed preserve lands.

Many wildlife species depend on numerous habitats throughout their lives, so protecting contiguous open space is crucial. In addition, contiguous forest habitat supports native wildlife species that require large open space to survive. Such habitat supports natural ecological processes, such as predator/prey interactions and natural disturbance. The Proposed SEP-HCP Alternative will conserve up to 31,030 acres and it is likely that this level of open space conservation will not occur under the No Action Alternative. The preserve lands may also serve to buffer species against the negative consequences of habitat fragmentation. When habitat is fragmented, many birds are 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 Proposed SEP-HCP Alternative will be expected to result in a greater level of land preservation over the No Action Alternative. The preserve system will be primarily forest and shrubland vegetation communities used by the GCWA and BCVI; however, it is likely that the preserve system will also contain substantial native vegetation communities that will support the sheltering, nesting, and foraging requirements for many other Voluntarily Conserved and wildlife species. Ongoing management of the preserve system will reduce the risk of adverse impacts from adjacent land uses.

The protection of thousands of acres of natural vegetation in the Plan Area under the Proposed SEP-HCP Alternative will conserve natural ecological processes. Although the preserve system is managed for listed species habitat, tracts that provide benefits to multiple species will rank higher during the SEP-HCP's evaluation of potential preserve lands. Therefore, the protection of natural habitat in the SEP-HCP preserve system will likely yield some moderate direct beneficial impacts to general wildlife communities, compared to the No Action Alternative, because the current species composition, individual species abundance, and distribution of a self-sustaining native wildlife community will maintained through these larger, more contiguous preserves.

10% Participation Alternative

As previously stated, the 10% Participation Alternative will 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 wildlife resulting from anticipated land development will be similar to the impacts described for the No Action Alternative.

The primary difference between the 10% Participation Alternative and the No Action Alternative is the establishment and long-term management of a 7,390-acre preserve system which will include approximately 5,250 acres of GCWA habitat, 1,390 acres of BCVI habitat, and 750 acres of karst lands. Creating these large preserves and restricting public access will protect riparian habitat along creeks and streams. While some habitat conservation will occur under the No Action Alternative as the result of individual ESA compliance actions, the extent of these individual preserves will likely be less than the assured protection of 7,390 acres under the 10% Participation Alternative and the distribution of preserve lands under the No Action Alternative will likely be more scattered. The concentration of preserve land with more assured protection and guided management is likely to create a more effective habitat protection and biodiversity within the 7,390-acre preserve system than will be achieved with fewer, smaller, and more scattered protected areas under the No Action Alternative. Thus, these larger blocks of conserved habitat protected from development by the SEP-HCP will be more likely to yield benefits to general wildlife than the mitigation measures that will result from project-by-project authorizations with the Service. The difference will be small, however, as the total area that will be conserved under this alternative will be small compared to the total size of the area of potential effect. Therefore, the beneficial impacts of the 10% Participation Alternative on general wildlife communities will likely be only minor, compared to the No Action Alternative, because while the preserve size is likely more contiguous, it is still a relatively small area compared to the impacts expected from development.

Single-County Alternative

The Single-County Alternative will not significantly influence the amount, timing, or location of land development anticipated over the next 30 years. It will restrict the location of mitigation lands to Bexar County, plus a 10-mile buffer around Bexar County. The potentially adverse impacts to general wildlife resulting from anticipated land development will be similar to the impacts described for the No Action Alternative.

The primary difference between the Single-County Alternative and the No Action Alternative is the establishment and long-term management of a preserve system of up to 16,014 acres. Although the preserve locations have not been identified, it is assumed that habitat acquisition will be in large, more contiguous parcels. Creating these large preserves and restricting public access will protect habitat, and serve as a buffer from the negative consequences of habitat fragmentation and other disturbances. In the absence of contiguous habitat, many birds are 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).

While some habitat conservation will occur under the No Action Alternative as the result of individual ESA compliance actions, the extent of these individual preserves will likely be less than the protection of up to 16,014 acres under the Single County Alternative and the distribution of preserve lands under the No Action Alternative will likely be more scattered. The preserve lands proposed for the Single-County Alternative will be concentrated closer to San Antonio and could result in greater risk of invasion and establishment of non-native plants and wildlife predation as a result of exposure to adjacent urbanized land uses. Ongoing management of the preserve system, as described in Chapter 1, which will include public education, will reduce the chance of adverse edge effects of adjacent land uses such as ways to manage household pets, using native plants in landscaping, and appropriate ways to feed backyard wildlife. The larger preserves contained in this alternative will also reduce exposure to

adjacent land uses. Therefore, the Single-County Alternative will yield moderate beneficial impacts to native wildlife populations, compared to the No Action Alternative, because of the establishment and long-term management of such a large preserve system that will contain numerous sizable areas of contiguous, undeveloped land throughout Bexar County, plus the 10-mile buffer.

Increased Mitigation Alternative

The Increased Mitigation Alternative, like the other alternatives, is not anticipated to influence land development trends in the Plan Area over the next 30 years. The potential adverse impacts on general wildlife species as a result of anticipated land development over the next 30 years will be the same as the No Action Alternative.

The Increased Mitigation Alternative proposes to establish up to 43,741 acres in a preserve. This much larger preserve, compared to the other Action Alternatives, will result in less fragmentation of native vegetation communities by land developments, invasion and establishment of non-native vegetation, and disruption of wildlife communities. The BCVI habitat mitigation will be mostly located in rural areas of the Plan Area, whereas, the majority (60 percent) of the GCWA habitat mitigation area in this system will be contained within five miles of Bexar County. When compared to the No Action Alternative, the GCWA habitat mitigation area contemplated for the Increased Mitigation Alternative is likely to contain larger areas of contiguous, undeveloped land in and within five miles of Bexar County. Some adverse edge effects from the rapidly urbanizing area could occur, but could be reduced through ongoing management, as described in Chapter 1, which includes public education on topics such as ways to manage household pets, using native plants in landscaping, and appropriate ways to feed backyard wildlife. Protecting potentially large, contiguous areas, tightly controlling public access and managing vegetation to maintain habitat characteristics will discourage invasive species and encourage native vegetation. 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. 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 a result, the Increased Mitigation Alternative could have a moderate beneficial effect to wildlife resources in the Plan Area, compared to the No Action Alternative, due to the larger preserve parcels, which will buffer against negative edge effects.

4.6 THREATENED AND ENDANGERED SPECIES COVERED BY THE SEP-HCP

4.6.1 Golden-cheeked Warbler – Affected Environment

The GCWA is a songbird that migrates annually between its wintering grounds in southern Mexico and Central America and its breeding grounds on the Edwards Plateau and adjacent areas in central Texas. The Service published the final rule listing the GCWA as federally endangered on December 27, 1990 (55 FR 53153) but has not designated critical habitat for the species. The GCWA was listed as endangered by the State of Texas on February 19, 1991 (Executive Order No. 91-001).

See the SEP-HCP's **Appendix C – Biology of the Covered Species** for a detailed species description.

4.6.2 Golden-cheeked Warbler - Environmental Consequences

Methodology

The GCWA will be covered by the ITP requested for the proposed SEP-HCP. The definition of terms used to describe the intensity of impacts are the same for all Covered Species, as follows:

Negligible: The Covered Species will not be affected or there will be no measureable change to the population in the area of potential impacts.

Minor: Measureable changes to the Covered Species or their habitat will be relatively localized within the area of potential impacts.

Moderate: Noticeable adverse or beneficial impacts to the population or habitat of the Covered Species within the area of potential impacts.

Major: Obvious impacts to the population or habitat of the Covered Species within the area of potential impacts and severe consequences or exceptional benefits.

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

- The primary threats to healthy of mature juniper-oak woodland habitat used by the species would decrease resulting in beneficial impacts.
- The primary threats to the health of mature juniper-oak woodland habitat used by the species would increase resulting in adverse impacts.
- The size of the local GCWA population within the Plan Area would substantially increase resulting in beneficial impacts.
- The size of the local GCWA population within the Plan Area would substantially decrease resulting in adverse impacts.
- The goals and objectives of the GCWA recovery plan are advanced or met resulting in beneficial impacts.
- The goals and objectives of the GCWA recovery plan are hindered or precluded from being met resulting in adverse impacts.

No Action Alternative

Under the No Action Alternative, the 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 within the Plan Area will impact GCWA habitat over the next 30 years. According to Groce *et al.* (2010) there is no evidence to indicate that the amount of GCWA breeding habitat is increasing or stable due to continued habitat loss and fragmentation from human development, shifts in land use, and construction of roads and utility transmission corridors. These threats are likely to be intensified by projected increases in human populations within the breeding range of the species.

Based on trends analyzed between 1992 and 2010 it is estimated that between 0.5 and 0.7 percent of GCWA habitat is lost each year in the Plan Area. If no action is taken, 51,150 acres, or 7.8 percent of the currently available GCWA habitat in the Plan Area is projected to be lost in the next 30 years. In Bexar County alone, excluding Camp Bullis, 14,883 acres, or approximately 25.2 percent, could be lost in the next 30 years directly to developed land uses. Under the No Action Alternative, individual projects within occupied GCWA habitat may pursue authorization from the Service in order to obtain an ITP and comply with the ESA. While ESA authorization will include the requirement that the impacts of any incidental take of the GCWA be mitigated to the maximum extent practicable, the overall benefit to the species from habitat protection resulting from individual ESA authorizations is likely to be minor, because the mitigation from individual projects is more likely to occur in relatively small and scattered or isolated patches of habitat equivalent to the amount of individual take authorized, and project-by

project mitigation would likely result in small isolated patches of protected habitat with a high potential for adverse effects from adjacent human activities.

There are approximately 658,670 acres of potential GCWA habitat in the Plan Area, which includes 171 properties under public and private ownership (not including military installations such as Camp Bullis) that currently offer some protection from future land development activities. These 171 properties contain between 55,000 and 60,000 acres of potential GCWA habitat. As stated above, approximately 51,150 acres of potential GCWA habitat could be lost under the No-Action Alternative within the next 30 years. Therefore, this relatively small amount of loss indicates that the No Action Alternative will not be likely to preclude the attainment of recovery for the GCWA, but will also not be likely to substantially contribute to meeting these goals, due to the likely small mitigation parcels. The No Action Alternative assumes that the status quo will continue in the future in terms of the current level of compliance/non-compliance with the ESA. Additionally, the recent trends affecting the GCWA in the Plan Area, particularly related to the loss of potential habitat will be expected to continue through the next 30 years and result in a moderate adverse impact to the species under the No-Action Alternative because there would be measureable decreases in species distribution and abundance and increased fragmentation, which reduces reproductive success.

Proposed SEP-HCP Alternative

Under the Proposed SEP-HCP, the Applicants will be authorized to incidentally take the GCWA related to the loss or degradation of up to 9,371 acres of potential GCWA habitat in the Enrollment Area. It is expected that land development will be implemented in the same socioeconomic context as the No Action Alternative and will experience similar levels and patterns. Accordingly, anticipated land development activities in the Plan Area will be expected to have similar potentially adverse impacts to the species as described for the No Action Alternative. Since implementation of the Proposed SEP-HCP Alternative will not be expected to substantially influence the total amount of anticipated habitat loss in the Plan Area during the permit term, the impacts of the Proposed SEP-HCP Alternative on the GCWA will be primarily associated with the mitigation provided by the SEP-HCP.

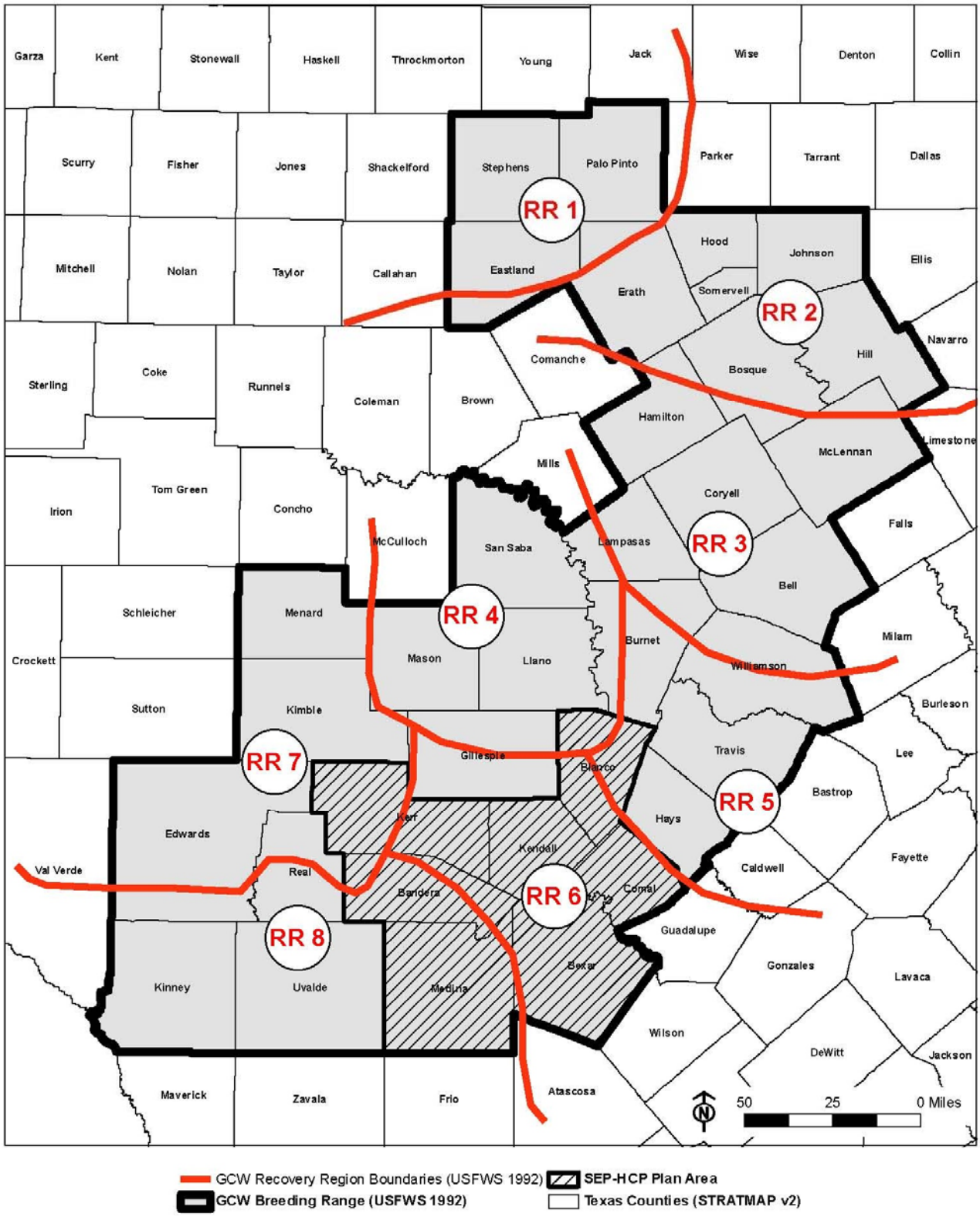
To mitigate for impacts to GCWAs, the SEP-HCP will create a 23,430 acre GCWA preserve. Preservation Credits will be assembled on a phased basis, as needed over the next 30 years to provide sufficient credits to offset impacts from participating public and private projects. Under the phased mitigation approach, habitat protection will always occur in advance of authorized impacts through the SEP-HCP; however, no pre-determined preserve system will be designated under the SEP-HCP. The Service will award Preservation Credits to the SEP-HCP in proportion to the acreage of potential GCWA habitat contained within the preserve system. Credits can be accrued by acquiring parcels of habitat or purchasing them from an existing Service-approved conservation bank. It is anticipated that most preserves will generate at least one Preservation 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 acre in the mitigation parcel will be based on the specific conditions of each site. In a similar fashion, the SEP-HCP will determine the mitigation needs for potential SEP-HCP 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 will be evaluated by reviewing site plans for SEP-HCP Participants. Direct impacts are assumed to apply to all areas of habitat within the boundaries of an Enrolled Property and are proposed to be assessed as two acres of mitigation for each acre of impact

(a 2:1 mitigation ratio). Indirect Impacts are assumed to apply to all areas of habitat within 300 feet outside of the boundaries of an Enrolled Property and are proposed to be assessed as one-half acre of mitigation for each acre of impact (a 0.5:1 mitigation ratio). Mitigation needs for SEP-HCP Participants will be assessed in terms of Preservation Credits where one credit is equal to one acre of protected habitat; although the SEP-HCP will 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 SEP-HCP will adequately be balanced by protected habitat in the preserve. The Proposed SEP-HCP Alternative may increase the amount of ESA compliance in the Plan Area, compared with the No Action Alternative, since compliance will be more efficient than obtaining authorization directly from the Service. Further, the Applicants propose to increase awareness of endangered species issues in the Plan Area, which may also lead to increased ESA compliance. Increased ESA compliance will benefit the species by ensuring that a larger portion of the anticipated habitat loss over the next 30 years will be balanced with conservation actions, such as habitat protection.

The 1992 GCWA Recovery Plan (Service 1992) identifies the criteria to be met for the GCWA 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 GCWA population in each of the eight recovery regions (**Figure 4-5**), where the potential for gene flow exists across regions to ensure long-term viability of the protected populations (Service 1992). Attaining the recovery goals for the GCWA includes the identification of focal areas for protection that include a single, viable GCWA population, or one or more smaller populations that are interconnected (Service 1992). While the ultimate size of the preserve system will be proportional to the amount of impact authorized through participation in the SEP-HCP, at full implementation approximately 23,430 acres of GCWA habitat would be permanently protected and managed for the benefit of the GCWA. With regard to GCWA recovery goals (Service 1992), the Proposed SEP-HCP Alternative will likely protect a focal area for GCWA conservation. In Recovery Unit 6, this goal is being partially met in Bexar County by existing conservation actions. Approximately 6,400 acres are currently being protected and managed explicitly for the GCWA in Bexar County and, while not specifically protected and managed for the GCWA, the Edwards Aquifer Protection Program has protected tens of thousands of acres in the Plan Area from future development. The Proposed SEP-HCP Alternative is likely to result in a moderate beneficial impact to the GCWA, compared to the No Action Alternative, due to the protection and management of high quality habitats and reduced fragmentation, which maintains reproductive success rates.

Figure 4-5: 1992 GCWA Recovery Region Boundaries



Source: Service 1992.

10% Participation Alternative

The 10% Participation Alternative will authorize take of approximately 2,100 acres of potential GCWA habitat within the Enrollment Area associated with Covered Activities. As mitigation, the SEP-HCP will acquire approximately 5,250 acres of GCWA habitat. Acquisition of the preserve system will occur within the first several years of the SEP-HCP.

The 10% Participation 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 will constitute a portion of the total amount of habitat loss that is projected to occur under the No Action Alternative in 30 years. The remainder of the anticipated habitat loss will either be authorized through individual ESA section 10(a) permits, section 7 consultations, or will occur without ESA authorization. It is possible that the 10% Participation Alternative will increase the amount of ESA compliance in the Plan Area, compared with the No Action Alternative, since compliance may be easier than obtaining authorization directly from the Service. However, the potential benefits of increased ESA compliance will be limited by the modest level of incidental take authorization available under this alternative. As described above, issuing an ITP under the 10% Participation Alternative will not be a prerequisite for land development in the Plan Area, and implementing the SEP-HCP will 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 will be similar to those described for the No Action Alternative (i.e., the alternative will provide ESA authorization for a portion of the total amount of anticipated habitat loss in the Plan Area over the next 30 years, but will 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 GCWA will be primarily associated with the mitigation provided by the 5,250-acre preserve system.

The direct and indirect impacts will be assessed like those under the SEP-HCP Proposed Alternative. Additionally, preserves would be purchased, preserved, and managed like those under the SEP-HCP Alternative, protecting key areas of potential habitat in Bexar County and City of San Antonio jurisdictions from future land development, thereby decreasing the threat of habitat loss for GCWAs. Therefore, the mitigation provided under the 10% Participation Alternative will likely result in a preserve system with greater conservation value than will be achieved under the No Action Alternative. However, the overall size of the GCWA preserve system under the 10% Participation Alternative will be modest in comparison to the other Action Alternatives and the recovery goals. Therefore, the preserve system will be likely to only have a minor beneficial impact on GCWA habitats. While it is difficult to predict precisely how GCWA populations will be affected by the protection of the 10% Participation Alternative's 5,250 acre GCWA preserve, it is unlikely that this preserve system will have substantial influence on the size of the regional or local GCWA populations, since these lands already support the species. With regard to recovery goals, the likely benefits of the preserve system will be limited by the relative size of the preserve system when compared to the other Action Alternatives. Therefore, this alternative is not likely to have substantial influence on the ability of recovery goals to be met. Overall, the 10% Participation Alternative is likely to result in only minor beneficial impacts to the GCWA, due to the limited size of GCWA preserves.

Single-County Alternative

The Single-County Participation Alternative is designed to offset the impacts associated with up 9,371 acres of development activity on potential GCWA habitat in the Enrollment Area. At full

implementation, the SEP-HCP preserve system will include approximately 11,714 acres of GCWA preserve. It will restrict purchase of conservation lands to Bexar County and up to10 miles outside of Bexar County. The Single-County Alternative will not significantly influence the amount or timing of land development anticipated over the next 30 years. Therefore, potentially adverse impacts to the GCWA resulting from anticipated land development under the Single-County Alternative will be similar to the impacts described for the No Action Alternative.

The most significant difference between the Single-County Alternative and the other Action Alternatives is that direct impacts are proposed to be off-set at a 1:1 ratio (that is one acre of mitigation for one acre of directly impacted habitat). All other Action Alternatives include a higher proposed mitigation ratio. The mitigation provided under the Single-County Alternative will likely result in a preserve system with greater conservation value than will likely be achieved under the No Action Alternative, due to the protection of larger blocks of potential habitat than will likely be achieved for smaller, individual mitigation actions. Overall, the Single-County Alternative will protect large areas of potential habitat in and around Bexar County from future land development, thereby decreasing the threat of habitat loss for many important areas of potential GCWA habitat and resulting in some beneficial effects to the species. The ultimate size of the preserve system will be proportional to the amount of impact authorized through participation and may ultimately include approximately 11,714 acres permanently protected and managed for the benefit of the GCWA. It is possible that the habitat protection afforded by the Single-County Alternative, in combination with other conservation lands, would generate a focal area for GCWA conservation.

It is difficult to predict precisely how GCWA populations will be affected by the protection of several thousand acres of potential habitat in and around Bexar County. It is unlikely that this preserve system will have substantial influence on the size of the regional or local GCWA populations, since these lands already support the species. However, it is possible that this preserve system will have a minor beneficial impact on the GCWA population because the 11,714-acre preserve in Bexar County will no longer be developable and will be conserved in perpetuity. With regard to recovery goals, the Single-County Alternative may protect or create a new focal area for GCWA conservation, but only if contiguous within itself and established adjacent to or near other conservation lands supporting the GCWA. The Single-County Alternative preserve system will contribute to this facet of GCWA recovery by providing some connectivity between large blocks of potential habitat. Therefore, this alternative will likely have a positive effect on the ability of recovery goals being met. The Single County Alternative is likely to result in minor to moderate beneficial impact to the GCWA, compared to the No Action Alternative, due to the size of the preserve and the permanent protections it will afford the GCWA.

Increased Mitigation Alternative

The Increased Mitigation Alternative will include approximately 35,141 acres of GCWA habitat. In return for the commitment to acquire a very large-scale, well-designed, and appropriately managed preserve system, the Permittees will be authorized to incidentally take 9,371 acres of GCWA habitat within Bexar County and City of San Antonio jurisdictions.

The Increased Mitigation Alternative proposes a 3:1 direct impact-to-mitigation ratio. The Increased Mitigation Alternative will have the potential to protect more of the local population of GCWA and will also likely help achieve recovery goals for the GCWA by conserving and/or enhancing habitat

connectivity across the landscape. The overall impact of the Increased Mitigation Alternative will likely be moderately beneficial for the GCWA, due to the larger size of permenatly protected GCWA habitat.

4.6.3 Black-capped Vireo - Affected Environment

The BCVI is a migratory bird present in Texas during its breeding season (March to September). The species was given endangered status by the Service on October 6, 1987 and the rule became effective on November 5, 1987 (52 FR 37420). The Service has not designated critical habitat for the BCVI. The BCVI was state-listed as threatened on March 1, 1987 and endangered on December 28, 1987.

See the SEP-HCP's **Appendix C – Biology of the Covered Species** for a detailed species description.

4.6.4 Black-capped Vireo - Environmental Consequences

Methodology

The BCVI will be covered by the ITP requested for the SEP-HCP. Definitions of terms used to measure intensity of impacts are as follows:

Negligible: The Covered Species will not be affected or there will be no measureable change to the population in the area of potential impacts.

Minor: Measureable changes to the Covered Species or their habitat however relatively localized within the area of potential impacts.

Moderate: Noticeable adverse or beneficial impacts to the population or habitat of the Covered Species within the area of potential impacts.

Major: Obvious impacts to the population or habitat of the Covered Species within the area of potential impacts and severe consequences or exceptional benefits.

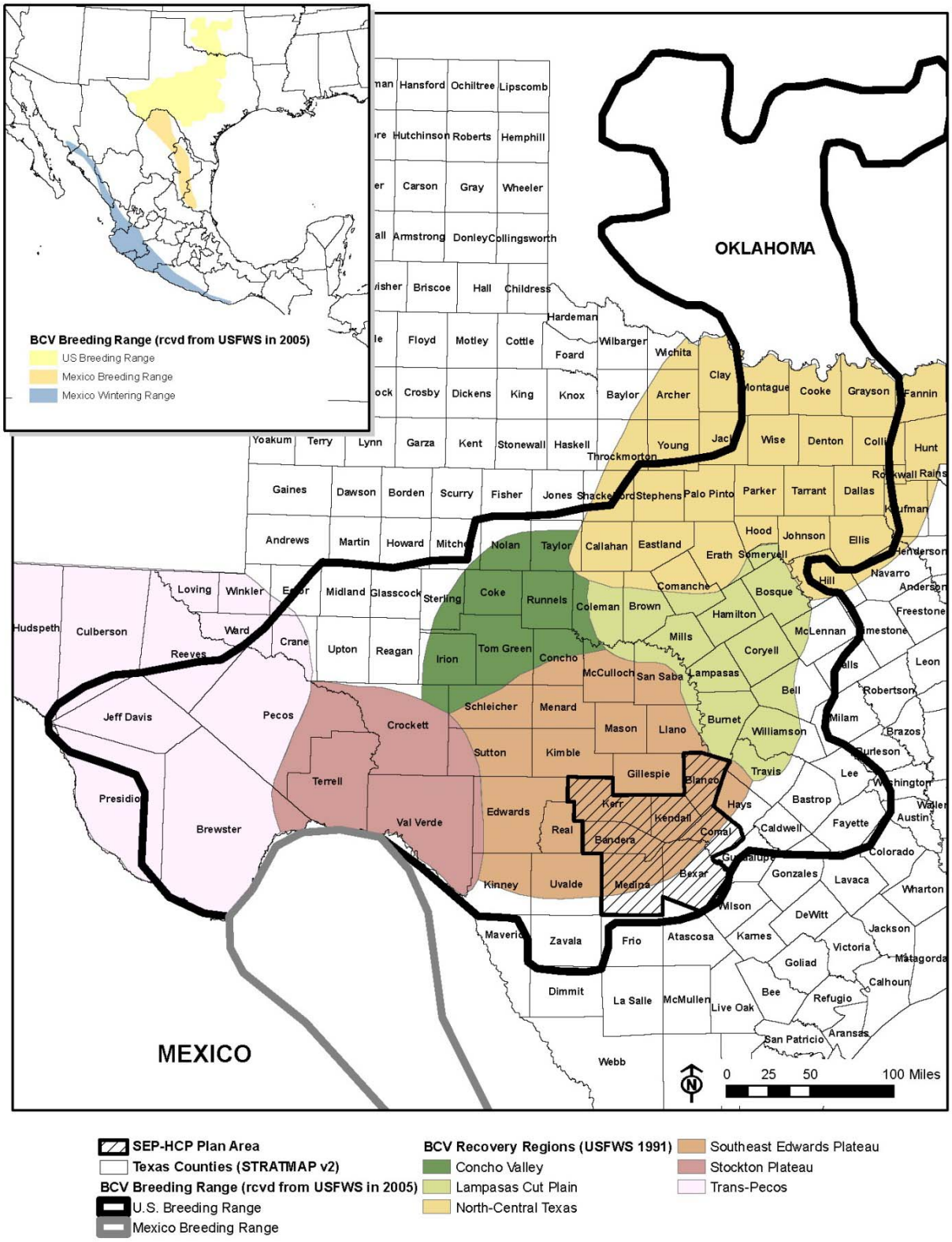
No Action Alternative

Under the No Action Alternative, the recent trends affecting the BCVI will be expected to continue through the next 30 years. In the Plan Area, developed land uses are increasing across the landscape, which is likely resulting in some loss of habitat for the BCVI. Under the No Action Alternative it is anticipated that 10,084 acres of BCVI habitat could be lost in the Plan Area between 2010 and 2040 with half of this loss occurring in Bexar County. 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 BCVI in the Plan Area, it is uncertain the extent to which land use changes and other regional trends will be expected to adversely or beneficially affect the species (both in terms of habitat availability and population size) under the No Action Alternative.

The recovery criteria in the 1991 Recovery Plan for the BCVI calls for the protection of at least one viable BCVI population composed of at least 500 to 1000 breeding pairs in four of six recovery regions in Texas, plus one each in Oklahoma and Mexico (see **Figure 4-6**). A status review by Wilkins *et al.* (2006) identified 1,018 BCVI observations in the Edwards Plateau recovery region. Most of these records were from protected lands, such as state parks and wildlife management areas, since most of the BCVI's breeding range occurs on private lands and was not accessible (Wilkens *et al.* 2006). The BCVI 5-year status review recommended the possible downlisting from endangered to threatened because the known BCVI population is currently much larger than known at the time of listing (USFWS 2007). Additionally, the primary threats to the species (habitat loss, grazing and browsing, brood parasitism, and vegetational succession) are not as great as they were at the time of listing (USFWS 2007).

Regardless of the overall impacts of land use changes in the Plan Area, individual projects within occupied BCVI habitat may seek authorization from the Service for an ITP to comply 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 Plan Area, the lack of reliable information regarding the status of the species in the Plan Area, and the inability to predict the level of compliance with the ESA, it is likely that some conservation efforts for the species will continue to take place, as they have in the past. ESA authorization will require that any occupied BCVI habitat that is disturbed or removed will be mitigated for by some form of permanent protection and/or management of habitat. However, the overall benefit to the species resulting from individual ESA authorizations under the No Action Alternative is likely to be negligible to minor, due to the smaller more isolated patches typically preserved/managed as part of individual projects.

Figure 4-6: 1991 BCVI Recovery Region Boundaries



Source: Service 1991.

Proposed SEP-HCP Alternative

The Proposed SEP-HCP Alternative will be implemented in the same socioeconomic context as the No Action Alternative and will experience similar levels and patterns of land development. Accordingly, anticipated land development activities in the county are expected to have similar potentially adverse impacts to the species as described in the No Action Alternative.

Under the Proposed SEP-HCP Alternative, authorization will be given to incidentally take BCVI related to the loss or degradation of up to 2,640 acres of potential BCVI habitat in Bexar County and City of San Antonio jurisdictions over 30 years. To mitigate for those impacts, the SEP-HCP will create a preserve system under a phased mitigation approach, with a target size of approximately 6,600 acres of BCVI habitat that will be managed in perpetuity. The preserve system will be developed on a phased basis as needed over the next 30 years to provide sufficient Preservation Credits to offset impacts from participating public and private projects. Under the phased mitigation approach, habitat protection will always occur in advance of authorized impacts through the SEP-HCP; however, no pre-determined preserve system will be designated under the SEP-HCP.

The direct and indirect impacts to potential habitat will be evaluated by reviewing site plans for SEP-HCP Participants. Direct impacts are assumed to apply to all areas of habitat within the boundaries of an Enrolled Property and are proposed to be assessed as two acres of mitigation for each acre of impact (a 2:1 mitigation ratio). Indirect Impacts are assumed to apply to all areas of habitat within 300 feet outside of the boundaries of an Enrolled Property and are proposed to be assessed as one-half acre of mitigation for each acre of impact (a 0.5:1 mitigation ratio). Mitigation needs for SEP-HCP Participants will be assessed in terms of Preservation Credits where one credit is equal to one acre of protected habitat; although the SEP-HCP will 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 SEP-HCP will adequately be balanced by protected habitat in the preserve. BCVI Preservation Credits under the Proposed SEP-HCP Alternative will be awarded to the SEP-HCP by the Service based on the number of acres of BCVI habitat within the preserve system. The mitigation needs of projects seeking to authorize impacts to the Covered Species through the Proposed SEP-HCP Alternative will be determined by the administrator based on an on-site assessment of habitat conditions and site-specific development plans. Areas protected and managed for the benefit of the BCVI under the Proposed SEP-HCP Alternative will likely be larger than the mitigation typically needed to offset impacts associated with individual projects. These areas will be regularly managed and monitored in accordance with a Service-approved plan that addresses the maintenance of appropriate vegetative structure for the BCVI and reduces threats from nest parasites and browsing wildlife, and the BCVI management areas will be buffered from the impacts of adjacent land uses by being located within a larger system of preserve lands.

The Proposed SEP-HCP Alternative will provide a moderate benefit to BCVIs in the Plan Area, compared to the No Action Alternative, because permanent protection and management of 6,600 acres of BCVI habitat will alleviate some of the major threats to the BCVI in the Plan Area and will significantly contribute to meeting recovery goals in this recovery unit.

10% Participation Alternative

The Proposed SEP-HCP Alternative will be implemented in the same socioeconomic context as the No Action Alternative and will experience similar levels and patterns of land development. Accordingly, anticipated land development activities in the county are expected to have similar potentially adverse impacts to the species as described in the No Action Alternative.

The 10% Participation Alternative will authorize the loss or degradation of approximately 566 acres of potential habitat for the BCVI within Bexar County's and the City of San Antonio's jurisdictions. As mitigation, at least 1,390 acres of BCVI habitat will be acquired and managed for BCVI in perpetuity in the SEP-HCP Plan Area. It is possible that the 10% Participation Alternative will increase the amount of ESA compliance in the Plan Area, compared with the No Action Alternative, since compliance may be more efficient than obtaining authorization directly from the Service. This may be particularly true with regard to BCVI mitigation, which requires long-term obligations for regular BCVI habitat management activities. However, the potential benefits of increased ESA compliance will be limited by the modest level of incidental take authorization available under this alternative.

The remaining impacts of this alternative on the BCVI will be primarily associated with the 1,390 acres of BCVI habitat within the preserve system. The SEP-HCP assumes one acre of direct impact to potential BCVI habitat will require two Preservation Credits (2:1 ratio) from the SEP-HCP, and each half acre of indirect impact will use one Preservation Credit (0.5:1 ratio). Therefore, it is anticipated that impacts to habitat authorized through the SEP-HCP will be adequately balanced by perpetually managed BCVI habitat within the preserve system. The mitigation provided under the 10% Participation Alternative will be provided in relatively large blocks within portions of the preserve system that are not managed as GCWA habitat. This alternative will create BCVI management areas that will be larger than the mitigation typically needed to offset impacts associated with individual projects. BCVI habitat within the preserve system will also be regularly managed and monitored in accordance with a Service-approved management plan that addresses the maintenance of appropriate vegetative structure for the BCVI and reduces threats from nest parasites and browsing wildlife. Further, the BCVI management areas under this alternative will be buffered from the impacts of adjacent land uses by being located within a larger system of preserve lands.

Therefore, the 10% Participation Alternative will be expected to alleviate some of the major threats to the species for a moderately sized area of BCVI habitat and will somewhat contribute to the recovery of the BCVI, thereby providing a minor benefit to the species in the Plan Area, compared to the No Action Alternative.

Single-County Alternative

The Single-County Alternative will not significantly influence the amount, timing, or location of land development anticipated over the next 30 years. It will restrict purchase of preserve lands to Bexar County, plus a 10-mile buffer around Bexar County. The potentially adverse impacts to the BCVI resulting from anticipated land development (whether authorized through the SEP-HCP or an individual ESA authorization) will be similar to the impacts described for the No Action Alternative.

The Single-County Alternative is designed to offset the impacts associated with 2,640 acres of BCVI habitat in the Enrollment Area. At full implementation, the Single-County Alternative proposes a preserve system that will include approximately 3,300 acres of BCVI habitat. Because preserves will be located within and adjacent to an urban/suburban environment, BCVI may be more susceptible to adverse effects associated with proximity to human activities, such as noise, predation from pets/other

animals such cowbirds and raccoons. The most significant difference in the Single-County Alternative and the other alternatives is that the Single-County Alterative will have a 1:1 ratio of direct take to mitigation while the others have a 2:1 ratio. This results in a preserve size likely greater than the No Action Alternative, double the size of the 10% Alternative, but much smaller than the SEP HCP Proposed Alternative and Increased Mitigation Alternative.

The mitigation provided under the Single-County Alterative will likely result in a preserve system with greater conservation value than will likely be achieved under the No Action Alternative, even if similar acreage was protected and managed through individual ESA section 10(a) permits or section 7 authorizations. The enhanced conservation value of the Single-County Alternative's preserve system will result from the protection of larger blocks of habitat than will likely be achieved for smaller, individual mitigation actions under the No Action Alternative. Overall, the Single-County Alternative will protect large areas of potential habitat in and around Bexar County from future land development, thereby decreasing the threat of habitat loss for many important areas of potential BCVI habitat 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, and may ultimately include approximately 3,300 acres permanently protected and managed for the benefit of the BCVI. A preserve system of this size will be likely to have a moderate beneficial impact on the BCVI population in the Plan Area. It is difficult to predict precisely how BCVI populations will be affected by the protection of several thousand acres of potential habitat in the Plan Area. According to the SEP-HCP, the protection and management of approximately 6,600 acres of BCVI habitat would maintain a viable population for recovery purposes; the Single-County Alternative would conserve half of this amount. It is possible that this preserve system will have a minor beneficial impact on the size of the regional BCVI population.

It is likely that the Single-County Alternative will increase the amount of ESA compliance in the Plan Area, compared with the No Action Alternative, since compliance may be more efficient than obtaining authorization directly from the Service. This may be particularly true because ESA permittees could be required to engage in long-term obligations for regular BCVI habitat management activities with an individual ESA permit. Whereas habitat maintenance and monitoring will be the responsibility of the Applicants with an HCP and the SEP-HCP Participant would only be responsible for a one-time payment of the Preservation Credit fee, which could be an attractive alternative to obtaining an individual permit.

The mitigation provided under the Single-County Alternative will be provided in blocks that will support a moderate-sized, managed BCVI population or contribute to a cluster of adjacent properties that at a minimum support a moderate-sized managed population within portions of the preserve system that are not managed as GCWA habitat. This alternative will create BCVI management areas that will be larger than the mitigation typically needed to offset impacts associated with individual projects. BCVI habitat within the preserve system will also be regularly managed and monitored in accordance with a Service-approved management plan that addresses the maintenance of appropriate vegetative structure for the BCVI and reduces threats from nest parasites and browsing wildlife. Further, the BCVI management areas under this alternative will be buffered from the impacts of adjacent land uses by being located within a larger system of preserve lands than the 10% Participation Alternative or the No Action Alternative. This advantage is minimal because of the small size of the preserve system compared to the Proposed SEP-HCP Alternative or the Increased Mitigation Alternative. The mitigation provided under the Single-County Alternative will likely have a positive effect on the ability to meet

recovery goals in this unit. The Single County Alternative is likely to result in a minor beneficial impact to the BCVI, compared to the No Action Alternative, due to the limited size of the preserves.

Increased Mitigation Alternative
The Increased Mitigation Alternative requests the same amount of take and would provide the same amount of preserve for the BCVI as the Proposed SEP-HCP Alternative. The sole difference between the two alternatives is the cost Participants would pay per credit for direct impacts. The Proposed SEP-HCP Alternative would cost $4,000 per credit whereas the Increased Mitigation Alternative would cost $5,500 per credit. These differences are not significant enough to result in different effects to the BCVI. As such, the effects of the Increased Mitigation Alternative to the BCVI would be the same as the Proposed SEP-HCP Alternative resulting in moderate beneficial impacts because permanent protection and management of 6,600 acres of BCVI habitat will alleviate some of the major threats to the BCVI in the Plan Area and will significantly contribute to meeting recovery goals in this recovery unit.

4.6.5 Covered Karst Invertebrates - Affected Environment
Seven federally listed species of karst invertebrates will be covered by the ITP requested under the Proposed Action: Government Canyon Bat Cave Spider, Madla Cave Meshweaver, Braken Cave Meshweaver, Government Canyon Bat Cave Meshweaver, *Rhadine exilis* (a beetle with no common name), *Rhadine infernalis* (a beetle with no common name), and Helotes Mold Beetle (collectively the Covered Karst Invertebrates). These species are known as troglobites and spend their entire life cycle underground and are characterized by reduced or absent eyes, lack of pigmentation, elongation of sensory appendages, and low metabolic rates. All species were listed by the Service as endangered on December 26, 2000 and critical habitat was designated on April 8, 2003. None of these species or their habitats receives direct protection under Texas state law, since invertebrates are not included on the Texas Parks and Wildlife Department's (TPWD) list of threatened and endangered species.
See **Appendix C – Biology of the Covered Species** of the SEP-HCP for more details about the species, their habitat and distribution, and designated karst zones and Karst Fauna Regions (KFR).

4.6.6 Covered Karst Invertebrates - Environmental Consequences
The Covered Karst Invertebrates will be covered by the ITP requested under the Proposed Action. Indicators of impact significance vary by species and are provided in the appropriate subsection. Definitions of impact intensity, however, are similar for all Covered Karst Invertebrates and are as follows:

Negligible: The Covered Species will not be affected or there will be no measurable change to the population in the area of potential impacts.

Minor: Measurable changes to the Covered Species or their habitat however relatively localized within the area of potential impacts.

Moderate: Noticeable adverse or beneficial impacts to the population or habitat of the Covered Species within the area of potential impacts.

Major: Obvious impacts to the population or habitat of the Covered Species within the area of potential impacts and severe consequences or exceptional benefits.

No Action Alternative
Due to the general sensitivity of karst habitats and the limited known distribution of many of these species, increases in land development across the Plan Area could ultimately cause a decline in the numbers and range of one or more of these Covered Karst Invertebrates. Overall, the Service generally

lacks sufficient information on the distribution, abundance, life history, and specific habitat requirements of karst species. This factor in combination with the lack of information regarding the precise location and nature of future land development in the Plan Area, and the inability to predict the level of compliance with the ESA, make it difficult to predict the impacts and mitigation likely to occur under the No Action Alternative. Regardless of the overall impacts of land use changes in the Plan Area, individual projects within occupied karst habitat may require authorization from the Service in order to obtain an ITP and comply with the ESA. Some conservation efforts for the species will take place as individual ESA authorization will require that any occupied habitat that is disturbed or removed will be mitigated for by some form of permanent protection. The overall benefit to the species resulting from individual ESA authorizations under the No Action Alternative is likely to be negligible due to the smaller more isolated preserves typically preserved/managed as part of individual projects.

Proposed SEP-HCP Alternative

As with the No Action Alternative Covered Karst Invertebrates in the Plan Area will 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 impacts is uncertain due to the scarcity of information pertaining to these species. The SEP-HCP is designed to offset the impacts associated with up to 21,086 acres of development activity over potential habitat for the Covered Karst Invertebrates (i.e., the level of requested incidental take authorization). At full implementation, the SEP-HCP preserve system will include at least 1,000 acres of karst preserves under the Proposed SEP-HCP Alternative.

Mitigation measures included in the Proposed SEC-HCP Alternative include avoidance of occupied karst features by establishing a 750-foot no-disturbance buffer (Occupied Cave Zone) from feature entrances until the regional downlisting criteria are achieved. The downlisting criteria reference the Service's recovery standards for downlisting each of the Covered Karst Invertebrates (Service 2011). If access to an Occupied Cave Zone is allowed, Plan Participants will be assessed a flat fee for conducting activities within this area. Plan Participants could also provide acceptable preserve land in lieu of fees. Participants will be required to immediately notify the SEP-HCP and stop work within 50 feet of any discovered features for no more than seven days to allow for SEP-HCP-sponsored investigations of the feature. Participants will not be required to provide any additional mitigation or engage in any additional consultation with the SEP-HCP or the Service.

The level of incidental take authorization in the Proposed SEP-HCP Alternative represents 20 percent of the projected impacts to potential habitat for the Covered Karst Invertebrates within Bexar County or the City of San Antonio for the next 30 years. While the proposed SEP-HCP will cover seven listed karst species for incidental take under the ESA, the SEP-HCP's conservation program is likely to incidentally protect habitats for other species within the preserve system. The Proposed SEP-HCP Alternative will also promote the conservation of listed karst species through education and outreach programs and will fund research to increase the body of knowledge regarding their biology and conservation. The Proposed SEP-HCP Alternative is likely to result in a minor to moderate beneficial impact to the Covered Karst Invertebrates, compared to the No Action Alternative, due to the larger and likely more numerous karst preserves.

10% Participation Alternative

As previously stated, the 10% Participation Alternative will 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 karst species resulting from anticipated land development (whether authorized through the SEP-HCP, an individual ESA authorization, or without specific ESA compliance) will be similar to the impacts described for the No Action Alternative.

The primary difference between the 10% Participation Alternative and the No Action Alternative is the perpetual protection and management of 750 acres of karst preserve distributed across Bexar County. This alternative contemplates an incidental take request of 10,543 acres of potential Covered Karst Invertebrate habitat (i.e., the level of requested incidental take authorization). While some habitat conservation will occur under the No Action Alternative as the result of individual ESA compliance actions, the extent of these individual preserves will likely be less than the assured protection of 750 acres under the 10% Participation Alternative and the distribution of preserve lands under the No Action Alternative will likely be more scattered. The concentration of preserve land with more assured protection and guided management is likely to create a more effective habitat protection and biodiversity within the 750-acre karst preserve system than will be achieved with fewer, smaller, and more scattered protected areas under the No Action Alternative. Thus, these larger blocks of conserved habitat protected from development by the 10% Participation Alternative will be more likely to yield benefits to karst species overall than the mitigation measures that will result from project-by-project authorizations with the Service. However, the beneficial impacts of the 10% Participation Alternative on Covered Karst Invertebrates will likely be only minor, since the total area that will be conserved under this alternative will be small compared to the total size of the area of potential effect.

Single-County Alternative

The Single-County Alternative will not significantly influence the amount timing, or location of land development anticipated over the next 30 years. It will restrict purchase of conservation lands to Bexar County, plus a 10-mile buffer around Bexar County. The potentially adverse impacts to Covered Karst Invertebrates resulting from anticipated land development (whether authorized through the SEP-HCP, an individual ESA authorization, or without specific ESA compliance) will be similar to the impacts described for the No Action Alternative. The Single County Alternative is identical to the Proposed SEP-HCP Alternative for Covered Karst Invertebrates. Therefore, this alternative will also likely result in a minor to moderate beneficial impact to the Covered Karst Invertebrates, compared to the No Action Alternative, due to the larger and likely more numerous karst preserves.

Increased Mitigation Alternative

The Increased Mitigation Alternative, like the other alternatives, is not anticipated to influence land development trends in the Plan Area over the next 30 years since participation in the SEP-HCP will be voluntary and individual compliance options will still be available. The incidental take authorization of Covered Karst Invertebrates habitat under the Increased Mitigation Alternative will have adverse impacts on Covered Karst Invertebrates similar to the No Action Alternative. However, the potential adverse impacts on Covered Karst Invertebrates as a result of anticipated land development over the next 30 years will be reduced because of the number and size of preserves proposed under this alternative.

The Increased Mitigation Alternative proposes long-term management of a 2,000-acre Covered Karst Invertebrates preserve system based on the acquisition of six new karst preserves in each of five KFRs in the Plan Area. This preserve size is double that proposed for the Proposed SEP-HCP and Single-County alternatives and more than double that of the 10% Participation Alternative. As a result, the Increased Mitigation Alternative could have a moderate benefit to the Covered Karst Invertebrates in the

Plan Area, compared to the No Action Alternative because protecting large, contiguous areas, tightly controlling public access and managing vegetation to maintain habitat characteristics will discourage invasive species and encourage native vegetation. 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 will buffer the karst ecosystems against human disturbance.

4.7 SOCIOECONOMIC RESOURCES

4.7.1 Socioeconomic Resources - Affected Environment

Population Trends

The Plan Area is a growing region. Over the past decade the population has increased 24 percent which represents a growth rate that outpaced the overall population growth in state of Texas (**Table 0-6**).

Table 0-6: Population Growth 2000 to 2010

Area	Census 2000 Population	Census 2010 Population	Percent Change
State of Texas	20,851,820	25,145,561	21%
Plan Area	1,603,715	1,983,268	24%
Bandera	17,645	20,485	16%
Bexar	1,392,931	1,714,773	23%
Blanco	8,418	10,497	24%
Comal	78,021	108,472	39%
Kendall	23,743	33,410	41%
Kerr	43,653	49,625	14%
Medina	39,304	46,006	17%

Source: U.S. Census Bureau, 2000 Census and 2010 Census.

Comal and Kendall counties exhibited the fastest growth rates of the seven counties in the Plan Area, with estimated growth rates of approximately 39 percent and 41 percent between 2000 and 2010, respectively. However, the estimated population growth in these two counties represented only 11 percent of the total population increase in the Plan Area. Bexar County added the most population to the Plan Area (approximately 322,000 people) during that period. Kerr County had the lowest estimated growth rate of the counties in the Plan Area, with only an estimated 14 percent population increase between 2000 and 2010.

The SEP-HCP has a planning horizon of 30 years, extending from 2010 until 2040; although these years were used for planning, the permit wouldn't be issued until at least 2015. Based on available state and county-level data, population projections through 2040 were produced using a least squares formula; a statistical method used to forecast trends while minimizing error. The 2010 population numbers are from the 2010 Census data while the forecasts are based on projections. The numbers have been adjusted and only represent population growth where Covered Activities will occur and where habitat for the Covered Species is generally located. **Table 0-7** shows that the Plan Area is projected to grow 61.6 percent between 2010 and 2040.

Table 0-7: Projected Population Growth 2010 to 2040

Area	2010	2020	2030	2040	2010 to 2040 Percent Change
Plan Area	1,983,268	2,318,780	1,722,881	3,205,229	61.6%
Bandera	20,485	26,406	30,205	34,004	66.0%
Bexar *	1,714,773	1,955,272	2,242,923	2,530,872	47.6%
Blanco	10,497	11,423	12,700	14,028	33.6%
Comal	108,472	168,408	237,164	331,520	205.6%
Kendall	33,410	47,516	60,099	71,442	113.8%
Kerr	49,625	56,374	61,447	80,059	61.3%
Medina	46,006	53,381	78,343	143,303	211.5%

Source: US Census Bureau, 2010 Census, ESRI BIS (2009) and Wendell Davis & Associates (2010a).
* The Bexar County numbers have been adjusted and represent the population projections for only the northwest portion of the county. This portion of Bexar County is where Covered Activities are likely to occur and where habitat for the Covered Species is generally located.

Employment and Economic Trends

The Plan Area boasts a diverse economy dominated by the educational and healthcare sectors as well as retail trade, professional, scientific, management, administration, and waste management industries (**Table 0-8**). Bexar County is the major employment center in the Plan Area accounting for 86.8 percent of all jobs in the region. Bexar County is also home to several military installations which employ almost 23,000 people.

The health of the regional economy can also be measured by household income. The median household income in the Plan Area was $47,048 in 2010. Kendall and Comal County households were generally wealthier with a median household income of $66,655 and $64,752 respectively. And, Kerr and Bandera County households earned a lower median household income when compared to the other counties in the Plan Area ($43,072 and $44,352, respectively) (**Table 0-9).** In comparison, the median household income in the state of Texas was $49,646 in 2010 and was $51,914 in the United States overall (US Census Bureau 2010).

The Texas Workforce Commission (TWC) provides employment projections for the state of Texas in regions known as Workforce Development Areas (WDA). Statistics for the Alamo WDA cover Atascosa, Bandera, Bexar, Comal, Frio, Gillespie, Guadalupe, Karnes, Kendall, Kerr, Medina and Wilson counties. For this analysis it is assumed that the trends forecasted for the Alamo WDA represent the likely trends in employment growth within the Plan Area. Between 2008 and 2018 employment in the Alamo WDA is forecast to grow 20 percent overall, adding over 620,000 new jobs. The industries currently driving the economy within the Plan Area, particularly education and healthcare, are forecasted to lead the regional economy, in terms of employment growth, into the future. Assuming that these trends continue more than 1.4 million employees could be working in the Plan Area by 2040. The TWC projections also provide forecasted 10-year growth rates (2008 to 2018) by industry. The data provided in **Table 0-10** assume that the industry trends forecasted by TWC between 2008 and 2018 will continue to 2040.

Table 0-8: Employment by Industry - 2010

County	Total Labor Force	Agriculture, Forestry, Fishing, Hunting and Mining	Construction	Manufacturing	Wholesale Trade	Retail Trade	Transportation & Warehousing, and Utilities	Information	Finance, Insurance, and Real Estate, Rental & Leasing	Professional, Scientific, & Management, and Administrative & Waste Management	Educational Services and Healthcare & Social Assistance	Arts, Entertainment & Recreation And Accommodation & Food Services	Other Services (Except Public Administration)	Public Administration	Armed Forces	Unemployed
SEP-HCP Plan Area		8,484	73,233	52,334	24,886	102,162	40,542	20,310	80,552	91,386	188,689	82,527	43,286	46,495	23,391	62,191
Bandera	9,334	435	1,151	442	133	1,019	434	40	639	886	1,649	793	633	624	0	456
Bexar*	816,333	4,864	60,387	44,307	21,801	87,948	35,297	18,424	71,493	79,856	163,102	73,044	37,264	40,777	22,975	54,794
Blanco	5,147	180	881	120	68	651	216	54	343	581	775	468	224	293	0	293
Comal	51,633	663	5,387	3,833	1,684	6,441	2,353	1,013	3,574	5,281	9,816	4,059	2,274	2,061	287	2,907
Kendall	15,800	678	1,706	1,145	312	1,400	495	202	1,611	1,743	3,079	1,096	861	706	78	688
Kerr	22,031	657	1,803	1,095	369	2,839	673	339	1,374	1,732	5,843	1,898	1,264	819	6	1,320
Medina	20,190	1,007	1,918	1,392	519	1,864	1,074	238	1,518	1,307	4,425	1,169	766	1,215	45	1,733

Source: US Census Bureau, 2006-2010 American Survey 5-Year Estimates – 2010 Selected Economic Characteristics by County

* Includes all of Bexar County In 2010, 6.6 percent of the labor force in the Plan Area was unemployed. While more than 62,000 people were without work in 2010 in the Plan Area, the economy of the Plan Area outperformed the state of Texas (8.2 percent unemployed) and the Nation (9.9 percent unemployed) (US Bureau of Labor Statistics, January 2010).

Table 0-9: Household Income - 2010

County	Total Households	Less than $24,999		$25,000 to $49,999		$50,000 to $74,999		$75,000 to $99,999		$100,000 or More		Median HH Income ($)
		Households	Percentage of Total	Households	Percentage of Total	Households	Percentage of Total	Households	Percentage of Total	Households	Percentage of Total	
Plan Area	679,008	172,682	25.4%	178,089	26.2%	125,299	18.5%	80,940	11.9%	121,998	18.0%	47,048
Bandera	8,419	2,480	29.5%	2,297	27.3%	1,454	17.3%	1,028	12.2%	1,160	13.8%	44,352
Bexar*	580,224	151,691	26.1%	153,572	26.5%	107,781	18.6%	67,656	11.7%	99,524	17.2%	47,048
Blanco	3,935	866	22.0%	1,247	31.7%	471	12.0%	536	13.6%	815	20.7%	46,128
Comal	38,984	6,322	16.2%	8,508	21.8%	7,175	18.4%	6,116	15.7%	10,863	27.9%	64,752
Kendall	12,055	2,076	17.2%	2,540	21.1%	1,878	15.6%	1,556	12.9%	4,005	33.2%	66,655
Kerr	20,285	5,492	27.1%	6,026	29.7%	3,614	17.8%	2,025	10.0%	3,128	15.4%	43,072
Medina	15,106	3,755	24.9%	3,899	25.8%	2,926	19.4%	2,023	13.4%	2,503	16.6%	49,138

Source: US Census Bureau, 2006-2010 American Survey 5-Year Estimates – 2010 Selected Economic Characteristics by County

Notes: * Includes all of Bexar County, total households may differ from other tables in this chapter.

Table 0-10: Projected Employment by Industry in the Plan Area* – 2010 to 2040

	Agriculture, Forestry, Fishing, Hunting and Mining	Construction	Manufacturing	Wholesale Trade	Retail Trade	Transportation & Warehousing, and Utilities	Information	Finance, Insurance, and Real Estate, Rental & Leasing	Professional, Scientific, & Management, and Administrative & Waste Management	Educational Services and Health Care & Social Assistance	Arts, Entertainment & Recreation And Accommodation & Food Services	Other Services (Except Public Administration)	Public Administration	Total
10-Year Growth Rate*	9.8%	24.8%	0.1%	13.6%	17.4%	14.6%	15.5%	16.2%	20.0%	32.2%	20.8%	16.4%	16.3%	N/A
2010	7,476	71,024	50,718	26,498	96,853	38,454	20,131	77,104	85,682	178,191	79,422	41,782	41,743	815,078
2020	8,209	88,638	50,769	30,102	113,705	44,068	23,251	89,595	102,818	235,569	95,942	48,634	48,547	979,847
2030	9,013	110,620	50,819	34,196	133,490	50,502	26,855	104,109	123,382	311,422	115,898	56,610	56,460	1,183,377
2040	9,896	138,054	50,870	38,846	156,717	57,876	31,018	120,975	148,058	411,699	140,004	65,894	65,663	1,435,572
2010 to 2040 Change	2,420	67,030	152	12,348	59,864	19,422	10,887	43,871	62,376	233,508	60,582	24,112	23,920	620,494

Source: Texas Workforce Commission, Alamo Workforce Development Area, Employment by Industry 2008 – 2018, US Census Bureau, 2005-2009 American Survey 5-Year Estimates – 2010 Selected Economic Characteristics by County

* Assumes that the 10-year growth rates forecasted for 2008 to 2018 by TWC will continue until 2040.

Housing Trends

In 2009 there were approximately 440,000 housing units in the Plan Area of which 67.4 percent were single-family homes (**Table 0-11**). This general housing pattern is similar throughout the counties in the Plan Area.

Table 0-11: Estimated Households and Housing Units (2009)

County	Number of Housing Units	Single-Family Housing Units	% Single-Family Housing Units	Non-Single-Family Housing Units	% Non-Single Family Housing Units
Plan Area	439,565	296,361	67.4%	143,204	32.6%
Bandera	11,500	7,753	67.4%	3,747	32.6%
Bexar*	320,404	212,013	66.2%	108,391	33.8%
Blanco	4,617	3,488	75.5%	1,129	24.5%
Comal	49,007	37,139	75.8%	11,868	24.2%
Kendall	14,173	9,310	65.7%	4,863	34.3%
Kerr	22,758	15,794	69.4%	6,964	30.6%
Medina	17,106	10,864	63.5%	6,242	36.5%

Source: ESRI BIS 2009 and Wendell Davis and Associates 2010a.

* Includes only portions of Bexar County and the Plan Area that are within a SEP-HCP sector.

Household characteristics, county appraisal district land use data, and the projected population growth were used to establish the overall demand for new housing in the Plan Area between 2010 and 2040 (**Table 0-12**).

Table 0-12: Projected Housing Units (2010, 2020, 2030 & 2040)

County	Projected Total Housing Units					Projected Single-Family Housing Units				
	2010	2020	2030	2040	2010-2040 % Change	2010	2020	2030	2040	2010-2040 Percent Change
Plan Area	437,595	558,890	690,406	779,150	78%	303,460	392,244	492,708	562,350	85%
Bandera	11,722	13,668	15,639	17,610	50%	7,902	9,393	10,884	12,375	57%
Bexar*	315,201	405,841	490,917	502,891	60%	216,738	281,781	344,991	353,654	63%
Blanco	4,682	5,290	5,890	6,514	39%	3,537	4,029	4,511	5,012	42%
Comal	50,931	69,772	96,751	133,413	162%	38,665	53,920	76,795	107,896	179%
Kendall	14,680	18,987	24,129	28,662	95%	9,649	13,044	16,917	20,410	112%
Kerr	23,019	25,825	28,314	36,946	61%	15,946	17,462	19,239	25,949	63%
Medina	17,359	19,507	28,766	53,113	206%	11,023	12,615	19,370	37,053	236%

Source: Wendell Davis and Associates 2010.

* Includes only portions of Bexar County and the Plan Area that are within a SEP-HCP sector.

Based on these projects there could be almost 880,000 new housing units built in the Plan Area by 2040 of which 72.2 percent are likely to be single-family homes. Based on these calculations, Medina County is anticipated to see the largest percent change in housing units overall with a 206 percent growth in housing units overall and a 236 percent increase in the number of single-family homes built in the county; however, Bexar County will experience the most development with 187,690 new housing units being built in the northern portion of the county.

Land Use

The Plan Area covered approximately 4.1 million acres with land uses that vary from densely urban to remote and rural. Within the Plan Area there are 42 cities including San Antonio, New Braunfels, Schertz, Leon Valley, Live Oak, Hondo, Boerne, Helotes, Kerrville, Bandera, and Blanco. The population of these 42 cities ranges from just over 100 to over 1 million people (Census Bureau 2010). Approximately 470,600 acres or 11 percent of the Plan Area are within a city limit (SAM, Inc. 2006). The remainder of the Plan Area is relatively rural and is either unincorporated or included in the ETJ of a city.

Land Use Distribution

Land use information was collected for parcels within the Plan Area from county appraisal districts in 2009 (**Table 0-13**).

Table 0-13: Land Use Categories and Descriptions

General Land Use Category	Description
Single-family Residential	Includes properties developed with stand-alone single-family residences or manufactured homes on single-family lots.
Non-single-family Residential	Includes properties developed with apartment buildings, mobile home parks, multiplex structures, and similar public and private dwelling units.
Commercial and Industrial	Includes properties developed as retail and other shopping center uses, office, wholesale, industrial, and other commercial uses.
Exempt	Includes exempt properties such as public-owned lands, lands owned by non-profit or religious and charitable organizations, schools, railroad property, and others. Also known to include some park or preserve land.
Transportation and Utility Rights-of-way	Estimation was necessary for this land use class because county appraisal districts do not typically track lands used as rights-of-way for transportation networks or utilities. It is assumed that 15 percent of the total developed acres are used for transportation and utilities rights-of-way in the rural areas of the Plan Area and that 30 percent of the total developed acres in more urban areas are used for transportation and utilities.
Available Lands	Includes vacant platted lots, unoccupied residential lots in builder inventory, agricultural lands, and lands with farm and ranch-related improvements. These lands are assumed to be available for future development or occupancy.
Other and Unclassified	Includes lands with other miscellaneous that are not classified in county appraisal district records (including public lands that are not recorded on county tax rolls). Known to include some areas of parkland or preserves (such as Government Canyon State Natural Area) and large water bodies (such as Canyon Lake). The acres assigned to this category were also adjusted to account for the remaining geographic area not included in other land use categories due to incomplete appraisal district parcel records. Land in this category is generally assumed to be unavailable for future development.

Source: Bandera, Bexar, Blanco, Comal, Kendall, Kerr and Medina County Appraisal Districts 2009.

Table 0-14 includes a summary of general 2009 land uses estimated for each county in the Plan Area. Some portions of Bexar County were not included if they did not contain habitat for the species covered by the SEP-HCP (i.e., parts of central and southeastern Bexar County) or were primarily federal lands (i.e., Camp Bullis) which will not be eligible to participate in the SEP-HCP.

Table 0-14: General Land Uses within the Plan Area in 2009 (acres)

County	Single-Family Residential	Non-Single-Family Residential	Commercial & Industrial	Exempt	Transportation & Utility ROW	Available Lands	Other Unclassified Land Uses
Plan Area	252,802	29,483	49,996	35,169	62,046	2,253,782	955,439
Bandera	20,546	3,436	3,377	5,479	4,473	266,750	206,254
Bexar*	74,740	5,937	28,050	1,329	23,936	108,933	57,174
Blanco	3,231	266	335	732	579	303,880	57,174
Comal	50,318	6,451	12,553	11,570	13,188	142,192	148,435
Kendall	20,910	5,246	2,160	2,894	4,284	353,760	35,034
Kerr	14,742	3,353	2,087	10,883	4,441	499,289	174,042
Medina	68,314	4,794	1,434	2,281	11,146	578,979	186,936

Source: Wendell Davis and Associates 2010.
* Includes only portions of Bexar County and the Plan Area that are within a SEP-HCP sector.

Land Use Projections

Projected land use and development changes within the Plan Area through 2040 are based on population projections, housing characteristics and trends, land use data, and other market factors Table **0-15**) (WDA 2010). Changes in single-family residential development were projected using population projections, household sizes, and target densities and historic trends to predict the extent of new single-family development. As the dominant developed land use, single-family residential uses were also used as a benchmark for projecting new development for multi-family residential, commercial/industrial, and exempt uses.

Table 0-15: Projected Distribution of Land Uses in the Plan Area in 2040 (acres)

County	Single-Family Residential	2009-2040 Percent Change	Non-Single-Family Residential	2009-2040 Percent Change	Commercial & Industrial	2009-2040 Percent Change	Exempt	2009-2040 Percent Change	Transportation & Utility ROW	2009-2040 Percent Change	Available Lands	2009-2040 Percent Change	Other Unclassified Land Uses	2009-2040 Percent Change
Plan Area	387,824	53.4%	40,049	35.8%	78,009	56.0%	55,571	58.0%	131,445	111.9%	2,012,629	-10.7%	933,190	-2.3%
Bandera	24,836	20.9%	4,276	24.4%	4,168	23.4%	7,371	34.5%	5,687	27.1%	257,795	-3.4%	206,184	0.0%
Bexar*	124,014	65.9%	7,873	3.26%	40,646	44.9%	2,124	59.8%	54,219	126.5%	23,672	-78.3%	47,551	-16.8%
Blanco	4,173	29.2%	313	17.7%	481	43.6%	742	1.4%	1,080	86.5%	302,486	-0.5%	147,312	157.7%
Comal	94,469	87.7%	7,521	16.6%	20,641	64.4%	18,604	60.8%	35,846	171.8%	68,945	-51.5%	138,681	-6.6%
Kendall	30,827	47.4%	6,127	16.8%	4,236	96.1%	6,202	114.3%	6,787	58.4%	335,180	-5.3%	34,929	-0.3%
Kerr	20,781	41.0%	3,968	18.3%	2,947	41.2%	12,747	17.1%	8,778	97.7%	487,215	-2.4%	172,401	-0.9%
Medina	88,725	29.2%	9,970	108.0%	4,891	241.1%	7,781	241.1%	19,049	70.9%	537,337	-7.2%	186,131	-0.4%

Source: Wendell Davis and Associates 2010.

* Includes only portions of Bexar County and the Plan Area that are within a SEP-HCP sector.

Table 0-16 summarizes the projected level of new development for the Plan Area by 2040, based on the Alamo WDA land use analysis.

Table 0-16: Acres of New Development Projected in the Plan Area (2009-2040)

County	Acres of New Development (2009-2040)	Average Annual Increase in New Development (2009–2040)
Plan Area	241,152	7,779
Bandera	8,955	289
Bexar*	85,260	2,750
Blanco	1,395	45
Comal	73,247	2,363
Kendall	18,580	599
Kerr	12,074	389
Medina	41,642	1,343

Source: Wendell Davis and Associates 2010.

* Includes only portions of Bexar County and the Plan Area that are within a SEP-HCP sector. SOUTH sector and Camp Bullis were not included in this analysis.

Revenue Analysis

An analysis was conducted to project the potential annual impact on property tax revenues of plan implementation to the counties within the Plan Area. The analysis used the total amount of potential habitat in each county (in acres) identified for the GCWA by the GCWA Habitat Model C2010 (Diamond 2010). A sample of parcels from each county was used to estimate the average per-acre tax rate and calculate the annual tax revenues received by each county in the Plan Area. Parcels of 50 acres or more, classified by the county appraisal districts in the Plan Area as: Native Pasture, Rangeland, or Wildlife Management, were used for the calculation. Tax-year 2012 land values, agricultural valuations, assessed values, assessed taxes, and tax rates were recorded for each sample parcel. The average tax revenue received per acre was then calculated for each county. The amount of GCWA habitat in each county was calculated as a percentage of total GCWA habitat available within the study area. The distribution of proposed preserve acreage for the Proposed SEP-HCP, 10% Participant, and Increased Mitigation alternatives was determined among all seven counties. However, the Single County Alternative required applying a proportional factor to identify the area of preserve in each county, but considered only the available GCWA habitat within Bexar County and surrounding counties up to a 10-mile radius of the Bexar County limits. According to these calculations, the annual property tax revenue loss to each county for the Proposed SEP-HCP, 10% Participant, and Increased Mitigation alternatives was $1.09, while the calculated rate for the Single-County Alternative was $1.18 per acre, per year in 2012 dollars.

4.7.2 Socioeconomic Resources - Environmental Consequences

Methodology

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

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

Minor: Changes in economic activities will be measurable but will be localized, will not influence the structure, composition, or function of the socioeconomic environment in the Plan Area and will be limited in context.

Moderate: Changes in economic activities will be noticeable, although localized, and may somewhat influence the structure, composition, or function of the socioeconomic environment of localities in the Plan Area, but will be limited in context.

Major: Changes in the economic activities will be measurable, will alter the structure, composition, or function of the socioeconomic environment in the Plan Area and may be extensive in context.

No Action Alternative

Under the No Action Alternative the Service will not issue an ESA section 10(a)(1)(B) permit, and the Applicants will not implement the SEP-HCP. Land development projects in the Plan Area will follow the standard procedures for complying with the ESA on a project-by-project basis. The No Action Alternative represents the status quo whereby land development projects will also be subject to the existing federal and state regulations concerning impacts to the natural and human environment.

As described above, more than 24,000 acres of land in the Plan Area is anticipated to be developed through 2040. This development could potentially contribute to the overall tax base and may serve the housing and employment needs of the future; however, it is unknown what impact these developments will have on the overall economy and employment opportunities. The economic well-being of the Plan

Area is linked to the success of its current market strengths and the development of new market niches within a local, national, and global economy.

The No Action Alternative will be expected to have only negligible adverse impacts on the socioeconomic resources because there will be no measurable change in economic activities resulting from not issuing the permit.

Proposed SEP-HCP Alternative

The Proposed SEP-HCP Alternative contemplates an alternate means to comply with the ESA by applying for an ITP for the duration of 30 years and developing a preserve system to serve as mitigation, all of which will be administered by Bexar County and the City of San Antonio. By implementing the Proposed SEP-HCP Alternative, the time needed for ESA compliance could be significantly reduced when compared to the No Action Alternative (one month as compared to years). The ESA compliance process under the Proposed SEP-HCP Alternative will not require an enrolled project to draft a HCP, draft a NEPA document, identify mitigation lands, or coordinate with the Service. Because there are fewer steps involved in the process, the costs of ESA compliance could be significantly less for enrolled projects—both in terms of time savings and decreased costs associated with hiring consultant staff—and could also be less for Service staff as they will not be required to review and process each application.

Despite these time and costs savings, the Proposed SEP-HCP Alternative is not expected to substantially affect the amount, timing, or location of land development over the next 30 years. Some projects may be able to accelerate their timeline; however, the overall economic effect will be negligible. Developed property could generate a higher tax base when compared to vacant land and could be added to the tax roll sooner if a project is completed at an accelerated pace; however, the beneficial effect to the tax base will be negligible (if any) as other aspects of land development play a larger role in the timing of projects.

The Proposed SEP-HCP Alternative assumes the conservation of 31,030 acres of habitat, the majority of which would likely occur in the more rural portions of the Plan Area. The potential loss of tax base as a result of conserving land in the Plan Area was calculated based on the preserve size and a per-acre tax revenue in each county in the seven-county Plan Area. The projected loss of tax revenue based on full implementation of the plan for the Proposed SEP-HCP Alternative would be $33,816 per year based on an average tax rate of $1.09 per acre (in 2012 dollars). This loss would be offset in the Enrollment Area by additional revenues from taxing the added value of improvements on developed land. Since tax revenue from developed land is considerably higher than on undeveloped land, the per-acre revenue would be substantially higher, in the order of many thousands of dollars per acre; however, the additional tax revenue cannot be calculated because predicting the type of development and estimating its value would be overly speculative.

Studies have suggested that the conservation of open space could have the effect of increasing property values of the surrounding land (McConnell and Walls 2005). These increases could result in beneficial impacts to the tax base, however, “the appreciated land value induced by open space conservation bears a spatial pattern,” which “is attributed to the spatial characteristics of conserved open space, such as size, shape, and spatial location” (Jiang and Swallow 2007). As the size, location and shape of the preserve land has not been identified, the potential increase in property values around the proposed preserve lands is not known.

Overall, adverse impacts to employment, income, and tax base as a result of the Proposed SEP-HCP Alternative will be negligible because there will be no measurable economic change resulting from this alternative.

10% Participation Alternative

The 10% Participation Alternative is comparable to the Proposed SEP-HCP Alternative in terms of establishing the proposed means for expediting the ESA compliance process. The potential beneficial and adverse impacts discussed for the Proposed SEP-HCP Alternative will be the same for the 10% Participation Alternative. The major differences between the Proposed SEP-HCP Alternative and the 10% Participation Alternative are the requested acres included in the incidental take of endangered species and the proposed acreage of preserve lands.

The 10% Participation Alternative calls for the conservation of 7,390 acres to be located in the more rural areas of the Plan Area. These acres will be conserved in perpetuity and land development activities will not occur here.

As with the Proposed SEP-HCP Alternative, there is a potential loss in tax base because this land will no longer be available for development. The projected preserve acreage allocated from study area counties in the 10% Participation Alternative is approximately 7,390 acres based on an average tax rate of $1.09 per acre, yielding a potential loss of approximately $8,053 per annum (2012 dollars). This loss would be offset in the Enrollment Area by additional revenues from taxing the added value of improvements on developed land. Since tax revenue from developed land is considerably higher than on undeveloped land, the per-acre revenue would be substantially higher, in the order of many thousands of dollars per acre; however, the additional tax revenue cannot be calculated because predicting the type of development and estimating its value would be overly speculative.

It is possible that projects enrolled in the SEP-HCP under the 10% Participation Alternative could be completed faster than will be possible under the No Action Alternative; however, as with the Proposed SEP-HCP Alternative, the overall economic impacts will likely be negligible. The 10% Participation Alternative contemplates covering only 10 percent of the projected loss of habitat in the enrollment area and it is possible that the amount of incidental take allocated to this alternative could be exhausted before the 30-year expiration of the requested permit. If the permit were to be exhausted prior to the 30-year expiration, projects that impact listed species will be required to comply with the ESA using the existing process. The 10% Participation Alternative will not affect the amount, timing, or location of land development, so despite the limited amount of requested take, this alternative will only result in adverse negligible impacts to employment, income, and tax base because there will be no measurable change in economic activities.

Single-County Alternative

The Single-County Alternative, like the other Action Alternatives, will establish an expedited process for complying with the ESA and will establish a system of preserve land to serve as mitigation for impacts to Covered Species. The major differences between the Single-County Alternative and the other Action Alternatives are the proposed acreage of preserve lands and the location of conservation actions.

The Single-County Alternative calls for the conservation of 16,014 acres to be located within Bexar County and/or within 10 miles of the Bexar County line, as opposed to throughout the seven-county

Plan Area. These acres will be conserved in perpetuity and land development activities will not occur here. The projected preserve assumed by the Single-County Alternative is approximately 16,014 acres, yielding a potential loss of approximately $18,950 per annum from the county tax base based on a tax rate of $1.18 per acre in 2012. This loss would be offset in the Enrollment Area by additional revenues from taxing the added value of improvements on developed land. Since tax revenue from developed land is considerably higher than on undeveloped land, the per-acre revenue would be substantially higher, in the order of many thousands of dollars per acre; however, the additional tax revenue cannot be calculated because predicting the type of development and estimating its value would be overly speculative.

Like the other Action Alternatives, it is possible that projects enrolled in the SEP-HCP under the Single-County Alternative could be completed faster than will be possible under the No Action Alternative; however, also like the other Action Alternatives, the overall economic impacts will likely be negligible. The Single-County Alternative is not expected to substantially affect the amount, timing, or location of land development over the next 30 years. Developed property could generate a higher tax base when compared to vacant land and could be added to the tax roll sooner if a project is completed at an accelerated pace; however, the beneficial effect to the tax base will be negligible (if any) as other aspects of land development play a larger role in the timing of projects.

The Single-County Alternative proposes the same amount of take in the Enrollment Area as the Proposed SEP-HCP Alternative for all of the Covered Species; however, it offers one-half of the preserve size and higher Preservation Credit costs for GCWA and BCVI. It is possible that the preserve size might not meet the anticipated need for incidental take authorization before the 30-year expiration of the requested permit. If the permit were to be exhausted prior to the 30-year expiration, projects that impact listed species will be required to comply with the ESA using the existing process. The Single-County Alternative will not substantially affect the amount, timing, or location of land development and does not replace the existing means to comply with the ESA, so despite the limited amount of proposed take and preserve lands, this alternative will only result in negligible adverse impacts to employment, income, and tax base because there will be no measurable change in economic activities.

Increased Mitigation Alternative

The Increased Mitigation Alternative, like the other Action Alternatives will establish an expedited process for complying with the ESA and will establish a system of preserve land to serve as mitigation for impacts to Covered Species. The major difference between the Increased Mitigation Alternative and the other Action Alternatives is the proposed acreage of preserve lands.

The Increased Mitigation Alternative calls for the conservation of 43,741 acres with a combination of preserves to be located in the more rural areas of the Plan Area and within and adjacent to Bexar County. These acres will be conserved in perpetuity and land development activities will not occur here. As with the other Action Alternatives, there is a potential loss in tax base because this land will no longer be available for development. The projected preserve acreage allocated from study area counties due to the Increased Mitigation Alternative would yield a potential loss of approximately $47,668 per annum (2012 dollars) from the county tax base based on an average tax rate of $1.18 per acre in 2012. This loss would be offset in the Enrollment Area by additional revenues from taxing the added value of improvements on developed land. Since tax revenue from developed land is considerably higher than on undeveloped land, the per-acre revenue would be substantially higher, in the order of many thousands of

dollars per acre; however, the additional tax revenue cannot be calculated because predicting the type of development and estimating its value would be overly speculative.

Like the other Action Alternatives, it is possible that projects enrolled in the SEP-HCP under the Increased Mitigation Alternative could be completed faster than will be possible under the No Action Alternative; however, also like the other Action Alternatives, the overall economic impacts will likely be negligible. The Increased Mitigation Alternative is not expected to substantially affect the amount, timing, or location of land development over the next 30 years. Developed property could generate a higher tax base when compared to vacant land and could be added to the tax roll sooner if a project is completed at an accelerated pace. The beneficial effect to the tax base could be more significant for this alternative since the size of the preserve system will be greater and will lead to more opportunities for adjacent properties to experience value increases due to the proximate principle. On the other hand costs proposed for this alternative are much higher for GCWA and BCVI mitigation which could adversely affect ESA compliance by discouraging participation in the Plan. Overall, the Increased Mitigation Alternative has the potential to result in minor adverse impacts to the socioeconomic environment because changes in economic activities could be measurable but localized; would not influence the structure, composition, or function of the socioeconomic environment in the Plan Area; and would be limited in context.

4.8 CLIMATE CHANGE

4.8.1 Affected Environment

The term climate refers to a “complex, interactive system consisting of the atmosphere, land surface, snow and ice, oceans and other bodies of water, and living things” (Le Treut *et al*. 2007). Different factors can act to change the climate. There are natural factors, such as volcanic eruptions and solar variations, as well as human factors, such as changes in atmospheric composition (Le Treut *et al.*2007). Climate change refers to a major shift in weather patterns over a number of years due to these factors. Recently, climate change has erroneously become synonymous with global warming, which is merely a subset of climate change. Global warming is defined as a temperature increase near the surface of the earth due to greenhouse gasses. Climate change is the incremental impact of past and present factors that when added together have the capacity to make major long-term changes in global weather patterns. Greenhouse gasses, such as carbon dioxide and water vapor, create a protective layer around Earth’s surface, trapping heat inside. This trapping of heat is referred to as the natural greenhouse effect. “Without the natural greenhouse effect, the average temperature at Earth’s surface will be below the freezing point of water” (Le Treut *et al.* 2007). However in recent years, excess carbon dioxide in the atmosphere has led to a spike in global temperatures. Atmospheric carbon dioxide levels have increased by about 35 percent since 1830 and grew by 80 percent between 1970 and 2004. Ice cores taken from polar ice caps show that pre-industrial levels of carbon dioxide were around 280 parts per million (ppm) whereas in 2005, they were measured at 379 ppm. "This exceeds by far the natural range over the last 650,000 years (180 to 300 ppm)" (Schmandt *et al.* 2009). Carbon dioxide is emitted whenever fossil fuels, including oil and coal, are burned. Texas ranks the highest among the states in carbon dioxide emissions, largely due to coal consumption (Schmandt *et al.* 2009). Additionally, "Texas leads the nation in energy consumption, accounting for more than one tenth of total U.S. energy use" (Schmandt *et al.* 2009).

A warming trend in both the atmosphere and the oceans has been observed at a time when historical models predict a cooling period. “It is extremely unlikely (<5 percent) that the global pattern of warming during the past half century can be explained without [human involvement]” (Hegerl *et al.*

2007). This temperature increase is therefore attributed to human activities, “primarily the combustion of fossil fuels and removal of forests” (Le Treut *et al.* 2007).

Many people incorrectly cite a cold winter or a cooling spot on the globe as evidence against global warming when in fact these cool patches are part of a natural cycle. Indeed, there are always extremes, but as the climate begins to change, the frequency and intensity of these extremes will begin to increase. In fact, these extremes are indicative of climate change, of which global warming is merely one aspect. Despite the extreme winter weather events that have occurred around the globe in recent memory, “the fact that the globe is warming emerges clearly” from average weather temperatures (Le Treut *et al.* 2007). In this century, the 9 warmest years have all occurred in the past 14 years (EPA 1997b). An increase in global surface temperature will lead to significant negative impacts on economies, wildlife, and overall quality of life (Claxton 2009).

The southwestern United States, including Texas, can expect hotter summers and less annual precipitation if the lifestyle and growth trends continue without significant changes. The Intergovernmental Panel on Climate Change predicted that by 2100, temperatures in Texas will increase by “about 3°F in the spring (with a range of 1 to 6°F) and about 4°F in other seasons (with a range of 1 to 9°F)” (EPA 1997b). On the southern Edwards Plateau, rainfall is predicted to drop by twenty percent and droughts to become commonplace (Claxton 2009). This will cause a downward spiral: an increase in temperatures will lead more people to crank up their air conditioning, which will lead to higher energy consumption, resulting in more air pollution, which will lead to an increase in emissions, which in turn will further heat up the atmosphere. Additionally, the mean annual temperature in cities worldwide can be 1.8 to 5.4°F warmer than surrounding rural areas leading to a further need for cooling. This is due to the urban heat island effect. The heat island effect is caused by the sun warming dry, exposed, urban surfaces, such as roofs and pavement. This effect is important to consider as it places many of the same demands on the local environment that climate change does on the global scale: increased energy consumption, elevated emissions of air pollutants and greenhouse gases resulting in compromised human health and comfort (EPA 2009).

This cumulative temperature increase will be detrimental to humans, plants, and animals. One study projects, that by 2050, instances of human heat-related deaths will triple to over 100 deaths per summer (EPA 1997b). Warming may expand the habitat of insects known to carry diseases thus increasing the possibility of outbreaks of diseases such as malaria (EPA 1997b). As hotter weather could increase the frequency of wildfires, we can also expect forests to recede and be replaced by grasslands (EPA 1997b). The destruction of forests, as well as the increase in temperature and decrease in rain, will adversely affect Texas ecosystems. As a direct result of current elevated temperatures, the migration patterns and the growing season of birds and butterflies have changed. Trees that are already stressed by drought may be too weak to resist the increase in pests and fires (Schmant *et al.* 2009). Trees absorb carbon dioxide in the atmosphere, absorb and defuse sunlight, and provide shade, so fewer trees means higher concentrations of carbon dioxide and more sunlight reaches the ground.

Studies suggest that a reduction in spring-flow, combined with an increase in temperature, could be devastating to endangered species in outflow locations. "Genetic aspects of biodiversity are illustrated by the global hotspot of endemism found in the isolated springs and cave systems of the Edward Plateau, a natural legacy unique to Texas" (Schmant *et al.* 2009). To protect the diversity of species in the region, flow restrictions may be placed on pumping, a cost of 0.5-2 million dollars per year (Chen *et al.* 2001).

Many cities, including San Antonio, use aquifers as their primary water source, and the aquifers depend on rainfall for recharge. Most climate change studies indicate a decrease in rainfall in the coming century. Even if rainfall remains constant, the increase in temperature will accelerate evaporation and enhance dryness in the region (Schmandt *et al.* 2009). This warmer climate will result in “as much as a 35 percent decrease in stream flow, and less water for recharging groundwater aquifers (EPA 1997b).” Considering only population growth in Texas and the resulting water demand, Texas water flows will decrease by 25 percent by 2050 under normal conditions and by 42 percent under drought conditions.

When climate change (estimated by a 3.5 degree Fahrenheit increase and a 5 percent precipitation decrease) is factored into the water balance, "2050 projected flows to the coast are 70 percent of the 2000 values under normal conditions and 15 percent under drought conditions" (Schmandt et al 2009). According to Mace and Wade (2008), “the Edwards Aquifer is one of the area’s most vulnerable to climate change impacts in the United States.” Other studies show that by 2090, climate change will increase municipal water demand by 1.5 to 3.5 percent and that, although crop yield will decrease, irrigation water demand will increase by over 30 percent (Chen *et al.* 2001). Mace and Wade (2008) also predict that as a result, Comal Springs will go dry as recharge falls.

There will also be a significant economic burden associated with climate change around the Edwards Aquifer. Agriculture in Texas is a $12.6 billion annual industry, two-thirds of which is livestock (EPA 1997b). A decrease in rainfall will lead to an increase in livestock, crop, and municipal water demand, which in turn will lower the profitability of farming (Chen *et al.* 2001). Chen *et al.* (2001) also predict a regional economic loss of 2.2 to 6.8 million dollars per year and a 30-45 percent reduction in farm income by 2090 (Chen *et al.* 2001). However, if the state took initiative to reduce the impacts that currently affect Texas, such as sea level rise, coastal erosion, air and water quality, and over-reliance on fossil fuels, they would "go a long way towards mitigating the impact of climate change on the State" (Schmandt *et al.* 2009). There is no formal policy in Texas to address climate change; however, indirect means to mitigate climate change are occurring at the municipal level in communities throughout the state. Programs that incentivize energy efficiency, conservation of water and natural resources, and changes in land use and transportation/transit use patterns result in reduced resource consumption and emissions.

Efforts to mitigate climate change are also being made on the national scale. The federal Clean Air Act dictates that the EPA will set air quality standards for six pollutants determined to be detrimental to the humans or wildlife, the most well-known of which is ozone (Claxton 2009). Children and seniors are particularly susceptible to ozone; high levels of ozone can cause irritation to the throat and lungs. High ozone levels can also adversely affect trees and vegetation (Claxton 2009). For each of the pollutants, the Clean Air Act mandates that the EPA set standards at a level at which they will have no known or anticipated impacts on the environment (Claxton 2009).

San Antonio and the surrounding counties had previously met these standard, but when the standard was updated, this area was in danger of being declared in nonattainment, or having ozone emissions above the standard. The area vowed to take action to cut back on ozone emissions by signing an Early Action Compact (EAC). The standards are currently being re-examined under the Obama Administration (San Antonio-Bexar County Metropolitan Planning Organization 2010).

Global climate change has the potential to alter the regional distribution of plant and animal communities by large-scale changes in average temperature, level and frequency of precipitation, groundwater regimes, and fire regimes. Climate change could cause areas currently containing suitable habitat for the Covered Species to increase or decrease in extent and quality. For the GCWA and the BCVI climate change could also cause areas not currently considered to be suitable habitat, including areas currently outside of the known range of the species, to become suitable habitat and it is possible that the species could adapt to use such habitat.

While it is generally agreed that insufficient knowledge currently exists to generate a reliable projection of the potential impacts of global climate change on GCWA species, the US Committee on the North American Bird Conservation Initiative has begun to assess the sensitivity of birds to climate change. In its report, 2010 State of the Birds, the GCWA was noted as a conservation species of concern with a medium climate change vulnerability risk (North American Bird Conservation Initiative 2010). Natural disasters, such as wildfire, prolonged and severe droughts, and floods are normal events that occur in Central Texas. However, climate change has been linked to an increase in frequency and intensity of these events (Natural Resources Defense Council 2013). Natural disasters have the potential to destroy or damage large expanses of suitable habitat – including preserve lands (e.g. recent wildfires in Bastrop County which impacted the Lost Pines HCP Area). The Service notes that wildfires occur on Camp Bullis during most years and typically burn an average of approximately 125 acres per year (Service 2005).

4.8.2 Environmental Consequences

Methodology

The implementation of any of the Action Alternatives will have very little effect on overall weather patterns over a number of years, and since climate change is due to incremental effects of natural and man-influenced events no one program is likely to significantly impact climate change. However, land use changes that reduce the extent or composition of carbon absorbing native communities within the Plan Area while increasing the urban heat island effect over time will be less beneficial or more adverse, and alternatives that have the potential to positively influence air quality by creating more vegetated open space will be considered to be beneficial. Therefore, qualitative differences in the alternatives are determined based on which alternative will be more likely to contribute to climate change.

The intensity of impacts to climate change are measured based on the definition of the following terms:

Negligible: Changes to land use, plant community size, integrity or continuity or urban development will not be likely to occur.

Minor: Relative impacts to natural habitat will occur, and land development will be concentrated into urban islands; also, development will be localized to a small percentage land use.

Moderate: A relatively large percentage of land use will experience measureable change in terms of an increase or reduction in open space, vegetation communities and heat islands.

Major: Substantial changes to large portions of open space, vegetation communities and large heat islands will be apparent.

No Action Alternative
As previously described, a total of 241,152 acres in the Plan Area will experience construction activities concentrated in northern Bexar County, southwestern Comal County and eastern Medina County with or without the SEP-HCP over the next 30 years. New development will include clearing and altering of vegetation prior to construction. Increased urbanization will result soil compaction, and a reduction of the soil's ability to hold and conduct water, nutrients, and air necessary for plant root activity, and increased runoff. Devegetation and fragmentation of open space along with an increase in development and urbanization will result production and concentration of greenhouse gasses and result in relatively minor adverse impacts on climate change.

Under the No Action Alternative, the impacts on climate via changes in land use or the creation of urban heat islands will not be mitigated, unless regional and national policies are changed to address the issue. Any necessary ESA authorizations related to land development projects will also occur under the No Action Alternative (i.e. individual ESA section 10(a)(1)(B) permits or section 7 consultations), and other open space could also be protected through compliance with other local, state, and federal regulations. As a result, some parcels containing natural vegetation communities will be conserved on a case-by-case basis and result in negligible beneficial impacts that could influence climate change in the Plan Area. Overall, however, minor adverse impacts to climate change will result from the No Action Alternative because relative impacts to natural habitat could occur, land development could be concentrated into urban islands, and ESA compliance for land development could be localized to a small percentage land use.

Proposed SEP-HCP Alternative
The Proposed SEP-HCP Alternative will not be expected to substantially affect the amount, timing, or location of land development over the next 30 years, with the exception of preventing future development from occurring in areas that are designated as preserve. Therefore, the adverse impacts to climate change associated with urban development and deforestation under the Proposed SEP-HCP Alternative will be similar to those described for the No Action Alternative.

Compared to the No Action Alternative, the Proposed SEP-HCP Alternative will be expected to result in a greater level of land conservation due to increased compliance with the ESA. It is anticipated that as much as approximately 31,000 acres of undeveloped land containing habitat for the Covered Species will be permanently protected under this alternative. Preserve land will be primarily forest and shrubland vegetation communities used by the GCWA and BCVI. It is likely that this level of open space conservation will not occur under the No Action Alternative. Moreover, preserve size balances open space with urban and residential development, minimizing adverse effects. The proposed SEP-HCP Alternative would have a minor beneficial impact on climate change because of the larger preserves, which would be expected to buffer against localized climate change impacts.

10% Participation Alternative
The 10% Participation Alternative will 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 climate change resulting from anticipated land development (whether authorized through the SEP-HCP, an individual ESA authorization) will be similar to the impacts described for the No Action Alternative.

The primary difference between the 10% Participation Alternative and the No Action Alternative is the establishment and long-term management of a 7,390-acre preserve system which will includes approximately 5,250 acres of GCWA habitat, 1,390 acres of BCVI habitat, and 750 acres of karst lands. While some habitat conservation will occur under the No Action Alternative as the result of individual ESA compliance actions, the extent of these individual preserves will likely be less than the assured protection of 7,390 acres under the 10% Participation Alternative and the distribution of preserve lands under the No Action Alternative will likely be more scattered. The concentration of preserve land with more assured protection and guided management is likely to create a more effective protection for open space containing natural vegetation communities contained within the 7,390-acre preserve system than will be achieved with fewer, smaller, and more scattered protected areas under the No Action Alternative. Thus, these larger blocks of conserved open space protected from development by the SEP-HCP will be more likely to yield benefits to regional air quality than the mitigation measures that will result from project-by-project authorizations with the Service. However, the beneficial impacts of the 10% Participation Alternative on climate would likely be only negligible as the total area that will be conserved under this alternative will be small compared to the total size of the area of potential effect.

Single-County Alternative

The Single-County Alternative will not have a significant influence on the amount, timing or location of land development anticipated over the next 30 years. It will restrict purchase of preserve lands to Bexar County, plus a 10-mile buffer around the county. The potentially adverse impacts to native vegetation resulting from anticipated land development (whether authorized through the SEP-HCP, an individual ESA authorization) will be similar to the impacts described for the No Action Alternative.

The primary difference between the Single-County Alternative and the No Action Alternative is the establishment and long-term management of a preserve system of up to 16,014 acres. Creating large preserves and restricting public access will protect natural landscapes. Riparian vegetation along streams will diffuse sunlight, and provide shade. While some habitat conservation will occur under the No Action Alternative as the result of individual ESA compliance actions and other park and open space initiatives, the extent of these individual preserves will likely be less than the assured protection of 16,014 acres under the Single County Alternative, furthermore the distribution of preserve lands will likely be more scattered. Larger blocks of conserved native vegetation protected from development by the SEP-HCP will be more likely to yield benefits to the ecosystem than the mitigation measures that will result from project-by-project authorizations with the Service under the No Action Alternative. Overall, the beneficial impacts of the Single County Alternative on climate will likely be minor, compared to the No Action Alternative, because all of the preserve lands proposed for the Single-County Alternative will be concentrated closer to the urbanized City of San Antonio and therefore may ameliorate the effects of the urban heat-island.

Increased Mitigation Alternative

The Increased Mitigation Alternative will not have a large influence on the amount, timing of land development anticipated over the next 30 years. Land development under the Increased Mitigation Alternative will have similar adverse effect as the No Action Alternative. Overall; however, the potential adverse impacts on deforestation will be reduced through the protection of habitat. The protection and management of relatively large blocks of native vegetation will help moderate temperatures, since large preserve blocks would have a greater effect on temperature than smaller parcels.

The establishment and long-term management of up to 43,741-acre preserve system, as proposed under this alternative, will reduce fragmentation of native vegetation communities by land developments which would moderate temperatures, and promote carbon absorption. Like the Single-County Alternative, the Increased Mitigation Alternative includes a requirement that some of the preserve land be located within or adjacent to Bexar County. The more urbanized land uses found in Bexar County increases the heat island phenomenon. However, this alternative will likely contain larger areas of contiguous, undeveloped land throughout the Plan Area than the No Action Alternative. Therefore, the potential beneficial impacts of the Increased Mitigation Alternative will be greater than those expected under the No Action Alternative, due to the protection of large, contiguous areas; control of public access; and management of vegetation to maintain habitat characteristics and encourage native vegetation.

4.9 CUMULATIVE IMPACTS

Cumulative impacts are defined in CEQ regulations (40 CFR § 1508.7) as:

> "…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 other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time."

The analysis considers the magnitude of the cumulative impact on the resource health. Health refers to the general overall condition, stability, or vitality of the resource and the trend of that condition. Therefore, the resource health and trend are key components of the cumulative impacts analysis. Laws, regulations, policies, or other factors that may change or sustain the resource trend will be considered to determine if more or less stress on the resource is likely in the foreseeable future. Opportunities to mitigate adverse cumulative impacts will be described.

Water Resources

Chapter 307.1 of the Texas Administrative Code addresses surface water quality standards for the State and 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 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 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).

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.

Cumulative impacts on water resources within the Plan Area will result from the rapidly increasing human population, increased development, and changes in land use over the next 30 years. New development will likely encroach onto aquifer recharge zones and could increase the potential for contamination of water. In addition, development activities in other Texas counties outside of the Plan Area could also impact water resources within the Plan Area. For the No Action Alternative, the continuation of land development trends has the potential of reducing or degrading available water supplies in the Plan Area and contributing to adverse cumulative impacts on the available water supply for humans, wildlife, and vegetation.

The implementation of the SEP-HCP will have the potential to create an overall cumulative, beneficial effect on water quality and quantity in the Plan Area and elsewhere across the region. The implementation of the SEP-HCP is expected to increase compliance with the ESA and result in more conservation actions for the Covered Species, primarily via the protection of large patches of native vegetation. In addition, these conservation actions will be more systematic than will individual, project-specific mitigation efforts for the Covered Species under the No Action Alternative. Water quality and aquifer recharge can be adversely affected by pavement and impervious cover associated with development. The systematic conservation of large patches of habitat for the Covered Species will better protect recharge features and vegetation that provide water filtration (such as riparian vegetation) when compared to smaller and more fragmented preserves associated with individual permits. The scale of these beneficial cumulative impacts will vary between negligible (10% Alternative) to minor (for the Proposed Alternative, Single County Alternative, or Increased Mitigation Alternative).

Vegetation

Over the last 10 years, conversion to grassland or shrubland vegetation was the most common fate of lost forest cover across the Plan Area, particularly outside of Bexar County. Conversion of forest cover to other, non-urban, land cover types accounted for approximately 87 percent of the forest cover loss across the Plan Area, and as much as 97 percent of the loss occurred in Blanco, Bandera, Kerr, Kendall and Medina counties. In the next 30 years a total of 234,000 acres in the Plan Area are projected to undergo construction activities with or without the SEP-HCP. Most of this land will be impacted by construction associated 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 will be expected to increase the amount of urban land cover in the Plan Area and decrease the amount of vegetation communities (particularly forest cover and grassland or shrub cover); however, a detailed projection of any such land cover change is not possible.

Cumulative impacts to vegetation communities within the area of potential effect will 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 the Plan Area 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 Action Alternatives evaluated in this EIS will result in moderate adverse impacts on vegetation (compared to current conditions) as land development trends will continue as described for the No Action Alternative; however, compared to the No Action Alternative, each of the Action Alternatives will have a somewhat positive impact on regional vegetation patterns as large blocks of mitigation lands within the Plan Area will be acquired and managed in perpetuity as habitat for the Covered Species.

Thus, the incremental impacts of each of these Action Alternatives will slightly offset the adverse cumulative impacts on vegetation from other regional impacts.

General Wildlife

Wildlife populations in the Plan Area are anticipated to be moderately adversely impacted as a result of the loss of vegetation communities. 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 Bexar County to be relatively high priorities for management and conservation efforts and identified 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) will decrease as humans convert or encroach upon natural landscapes. As discussed above for vegetation, the Action Alternatives will have a slight benefit to general wildlife populations compared to the cumulative impacts of the No Action Alternative as consolidated tracts of mitigation lands will be acquired and managed in perpetuity. These consolidated tracts of land will provide wildlife populations with the necessities required for species survival. Thus, the incremental impacts of each of the SEP-HCP Action Alternatives will slightly offset adverse cumulative impacts on general wildlife populations from other regional impacts.

Covered Species

Human activities within enrolled properties could cause a change in the local population of predator (cats, dogs, raccoons, etc.) species or competitor species (changes in vegetation/habitat) and thereby degrade the adjacent habitat and harm adjacent individuals of the Covered Species.

GCWA or BCVI could return to an enrolled Project Area that had previously been habitat but has since been removed or degraded. Species may be harmed by having to move to alternative habitat areas for breeding, feeding or sheltering. The authorized habitat loss will be a reasonably certain cause of this effect on returning individuals, but will typically occur after the habitat removal was complete. As previously described, a total of 234,000 acres in the Plan Area is projected to experience construction activities with or without the SEP-HCP over the next 30 years. Interrelated or interdependent construction or other land use activities that occur within Enrolled Project areas after the authorized take has occurred could cause noise or other disturbances that could harass neighboring GCWA or BCVI. Indirect impacts may occur as a result of changes to the surface plant and animal communities outside the Occupied Cave Zones. Land use changes that reduce the extent or composition of native communities within a preserve could diminish the long-term viability of such communities over time, and could affect the quality and quantity of water and nutrients feeding subterranean karst environments.

Any of the four Action Alternatives in the SEP-HCP will have the same cumulative impact on Covered Species. The SEP-HCP is not an essential cause of habitat loss because habitat loss will occur with or without the SEP-HCP, and does not constitute a new federal program authorizing new activities within potential impacts to the human environment because participation is voluntary.

Socioeconomic Resources

Recent socioeconomic trends in the Plan Area 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 the Plan Area. None of the Action Alternatives will be expected to have long-term cumulative socioeconomic impacts on the local or regional population, economic trends, employment rates, per capita income, or real estate transactions. Participants in the SEP-HCP will enjoy cost and time savings as a result of simplified ESA compliance, but these savings will not be expected to rise to a level that will significantly impact local or regional economies. The Service will experience a long-term beneficial impact under the Action Alternatives, since each of the SEP-HCP alternatives will reduce the amount of time and effort the Service will spend on individual ESA consultations. The time savings for individually permitting incidental take/s through the permitting process will likely result in a portion of the anticipated land development occurring one to two years sooner than will be expected with an individual ESA consultation, and could accelerate the growth of Bexar County's and any other participant's tax base. In addition, creation of large preserves under the Action Alternatives will likely increase the value of adjacent property, further increasing the local tax base by an undetermined amount. Each of the Action Alternatives require the dedication of revenues from the Bexar County's general maintenance and operations fund, which could negatively affect the County's ability to support services currently funded with these revenues; however, this effect will be mitigated by participation fees. For the proposed SEP-HCP, the amount of general fund revenues that could be dedicated to the implementation of the SEP-HCP will be approximately $1.31 million to over $1.12 billion over 30 years.

Climate Change

Regional climate results from processes that can be regional, continental, and even global in scale. Therefore, it is not appropriate to limit the examination of cumulative impacts to the specific geographic Plan Area as was done in the section above. The EPA (1997) predicts that over the next century, climate in Texas is likely to become warmer, with wider extremes in both temperature and precipitation. Weather in Texas is already highly variable and it is expected to become more so.

Over the next 30 years, the U.S. and world populations are each expected to increase by roughly 30 percent, with the U.S. population expected to increase by nearly 100 million people and the world population expected to increase by about 2 billion people (U.S. Census Bureau 2010). As the human population increases, so will demand for fossil fuels, renewable forms of energy, and other natural resources. Also expected to increase are the number of vehicles on roads, the number of motorized boats on the water, the number of planes in the air, the number of homes, businesses, and industries whose operations result in the emission of greenhouse gases, the number of people burning firewood for cooking and heating, and all other activities associated with an expanding human population.

As discussed in Section 4.8, implementation of all five alternatives is expected to result in minor negative or beneficial impacts. The potential contributions, however, would be imperceptible when compared against regional, national, and global outputs of greenhouse gases.

4.10 UNAVOIDABLE IMPACTS

Unavoidable 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 will meet the purpose and need of the action, eliminate the impact, and not cause other or similar significant impacts (40 CFR 1500.2(e).

It is expected that development in the Plan Area will continue as trends predict under the No Action Alternative, regardless of whether the SEP-HCP is implemented or not (see **Section 4.1**). Since impacts associated with anticipated land development will be the same for the No Action Alternative and each of the Proposed Action Alternatives, the differences in the impacts of the Proposed Action Alternatives will be limited to the impacts associated with the implementation of their conservation programs. Therefore, all alternatives discussed in this EIS will result in unavoidable impacts that will include loss of vegetation, native wildlife, and endangered species habitat, as well as some impacts to water resources.

4.11 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Under 40 CFR 1502.16, an irreversible commitment of resources is defined as the loss of future options and primarily applies to non-renewable resources, such as minerals or cultural resources, and to those resources 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 of the Proposed Action Alternatives, the loss of habitat for the threatened and endangered species in the Enrollment Area will result in irreversible habitat loss. However, the proposed preserves described for each Proposed Action Alternative will help ensure that habitat for these species will be protected and managed in perpetuity. Under all Proposed Action Alternatives, the commitment and funding by Bexar County and the City of San Antonio for acquisition and permanent management of mitigation properties will be irreversible. The commitment and funding of mitigation and monitoring activities for the duration of the Permit will also be irretrievable.

4.12 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 Alternatives, including the No Action Alternative will result in a short-term loss of habitat for the Covered Species in the Plan Area due to human population growth and the associated increase in land development. However, all Proposed Action Alternatives will 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.

CHAPTER 5

PREPARERS

5.1 PREPARERS AND CONTRIBUTORS

Name	Role	Contribution to EIS Preparation	Education	Years of Experience
US Fish and Wildlife Service – Lead Federal Agency				
Christina Williams	Fish and Wildlife Biologist	Federal Lead Agency	B.S. Biology	17
Tanya Sommer	Supervisory Fish and Wildlife Biologist	Federal Lead Agency	B.S. Biology, M.S. Biology	14
Jacobs Engineering Group – NEPA EIS Lead				
Leonard Voellinger	NEPA Project Manager	Preparation of EIS, Public Scoping	B.A. Anthropology, M.A. Geography	35
Tricia Bruck	NEPA Assistant Project Manager	Preparation of EIS, Public Scoping	B.S. Biology, M.S. Environmental Science	11
Jennifer Zankowski	Environmental Planner	Preparation of EIS	B.A. Human Ecology, M.S. Community and Regional Planning	6
Bowman Consulting, Inc. – HCP Lead				
Clifton Ladd	HCP Project Manager & Chief Scientist	Coordination Between EIS and HCP	B.A. Biology, M.S. Biology	32
Amanda Aurora	HCP Assistant Project Manager & Primary HCP Author	Coordination Between EIS and HCP	B.S. Wildlife Ecology, M.S. Biology	15
Jennifer Blair	HCP Project Manager & HCP Author Senior Environmental Scientist	Coordination Between EIS and HCP	B.S. Wildlife Biology	8
Laura Zebehazy	Staff Biologist	Coordination Between EIS and HCP	B.A. Environmental Studies M.S. Forest Wildlife Ecology	13
Deborah Blackburn	NEPA Specialist	Coordination Between EIS and HCP	B.S. Biology	14
Jackson Walker, LLP – Legal Counsel				
Jerry Webberman	Partner	Independent Legal Counsel	B.A. Law, J.D. Law	25
Megan Bluntzer	Associate	Independent Legal Counsel	B.A. Law, J.D. Law	7

Name	Role	Contribution to EIS Preparation	Education	Years of Experience
Wendell Davis & Associates – Economic Studies				
Wendell Davis	Land Planning & Development Consultant	Resource Assessments	B.A. Economics, Master of Community Planning	40
Shelley Hauschild	GIS Planner	Resource Assessments	B.A. Geography	9
Dan Phillips	Research Associate	Resource Assessments	B.S. Mass Communication	8
Ximenes & Associates – Public Involvement				
Linda Ximenes	Public Involvement Specialist, Facilitator	Public Scoping	B.A. Latin American Studies, M.A. Bilingual Bicultural Teacher Training	34
Sonia Jimenez	Public Involvement Specialist, Facilitator	Public Scoping	B.A. Psychology, J.D. Law	13
Zara Environmental, LLC – Biological Studies				
Jean Krejca	Chief Scientist & Karst Specialist	Resource Assessments	B.S. Zoology, Ph.D. Ecology, Evolution and Behavior	20
Rachel Barlow	Karst Biologist	Resource Assessments	B.S. Biology, M.S. Wildlife Ecology	9
Kristen McDermid	Karst Biologist	Resource Assessments	B.S. Ecology, Evolution and Behavior, M.S. Wildlife Ecology	6

CHAPTER 6

GLOSSARY OF TERMS AND ABBREVIATIONS

6.1 GLOSSARY OF TERMS

Agency Oversight Group (AOG)	SEP-HCP advisory committee composed of representatives from Bexar County, the City of San Antonio, Texas Parks and Wildlife Department, and the U.S. Fish and Wildlife Service. The AOG was created to facilitate coordination among the Applicants and the regulatory agencies.
Alternatives	Under NEPA, the Service must, "objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." Reasonable alternatives are those that substantially meet the purpose and need. A "no action alternative" must also be described and analyzed. This alternative is simply what will happen if the action was not taken.
Applicants	The County of Bexar, Texas and the City of San Antonio are jointly applying to the Service for an Incidental Take Permit under section 10(a)(1)(B) of the ESA. As the Applicants of the Incidental Take Permit, Bexar County and the City of San Antonio will be responsible to the Service for complying with the terms and conditions of the Incidental Take Permit and overseeing the implementation of the SEP-HCP. The specific responsibilities and duties of each Applicant will be specified in an Interlocal Agreement, which will require Service approval.
Aquifer	Rocks or sediments, such as cavernous limestone and unconsolidated sand, that store, conduct, and yield water in significant quantities.
Biological Advisory Team (BAT)	SEP-HCP advisory committee appointed by Bexar County and the Texas Parks and Wildlife Department to advise the Applicants on technical matters relating to the biology and conservation of the species and habitats addressed in the SEP-HCP, including calculating the degree of harm to the species covered by the plan and calculating the size and configuration of the needed habitat preserves. The BAT included eight members and met the requirements of Chapter 83 of the Texas Parks and Wildlife Code.

CFR	Code of Federal Regulations (the codification of the general and permanent rules and regulations published in the Federal Register by the executive departments and agencies of the federal government).
Citizen's Advisory Committee (CAC)	SEP-HCP advisory committee appointed by Bexar County to assist with development of the SEP-HCP, including reviewing the work of the Biological Advisory Team and the form and level of mitigation proposed in the plan, identifying appropriate funding mechanisms to implement the plan, and determining the method of participation in the plan. The CAC included 21 members representing a variety of community stakeholder interests and met the requirements of Chapter 83 of the Texas Parks and Wildlife Code.
Covered Activities	Otherwise lawful activities that may cause the permanent or temporary loss or degradation of habitat for one or more of the Covered Species. Temporary losses are only expected from management activities on preserves.
Covered Karst Invertebrates	A group of seven invertebrates, including four spiders and three beetles, that was federally listed as endangered on December 26, 2000 (*Neoleptoneta microps, Cicurina madla, Cicurina venii, Cicurina vespera, Rhadine exilis, Rhadine infernalis, and Batrisodes venyivi*). These species live entirely underground in the limestone caves and passages of the karst geologic formations that underlie the northern portion of Bexar County and adjacent areas. These karst invertebrates are Covered Species.
Covered Species	The species for which incidental take will be authorized and which are the focus of the SEP-HCP conservation program. Includes the GCWA, BCVI, and the Covered Karst Invertebrates (*Neoleptoneta microps, Cicurina madla, Cicurina venii, Cicurina vespera, Rhadine exilis, Rhadine infernalis, and Batrisodes venyivi*).

Designated Critical Habitat	A specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. Designated critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery. An area is designated as critical habitat after the Service publishes a proposed federal regulation in the Federal Register, receives and addresses public comments on the proposal, and publishes a final rule in the Federal Registers announcing the final boundaries of the designated critical habitat areas.
Cumulative Impact	An impact on the environment which 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 other actions.
Direct Impacts	The immediate impacts of an action that is not dependent on the occurrence of any additional intervening actions for the impacts to species or effects to designated critical habitat to occur.
Endangered Species Act (ESA)	Endangered Species Act of 1973, as amended (16 USC §1531 et seq.) is federal legislation intended to provide a means to conserve the ecosystems upon which endangered and threatened species depend and provide programs for the conservation of those species, thus preventing extinction of plants and animals.
Environmental Impact Statement (EIS)	A document required by the National Environmental Policy Act for certain actions “significantly affecting the quality of the human environment.” An EIS is a tool for decision making that describes the positive and negative environmental impacts of a proposed action.
ESA	Endangered Species Act of 1973, as amended (16 USC §1531 et seq.).
Geographic Information System (GIS)	Computer software that processes geographic data and is commonly used to map and analyze landscape features.
Habitat Conservation Plan (HCP)	A plan prepared under the ESA by non- federal parties wishing a obtain permit for the incidental taking of threatened and endangered species. A Habitat Conservation Plan is required to obtain an Incidental Take Permit under section 10(a)(1)(B) of the ESA.

Harass	An intentional or negligent act or omission which creates 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 to, breeding, feeding or sheltering (50 CFR § 17.3).
Harm	An act which 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 or sheltering (50 CFR § 17.3).
Incidental Take	Taking of a threatened or endangered species that result from carrying out an otherwise lawful activity. See “take” below.
Incidental Take Permit	A permit issued by the Service under section 10(a)(1)(B) of the ESA to non- federal entities authorizing the incidental taking of a threatened or endangered species.
Indirect Impacts	Impacts that are caused by the action but occur later in time or farther in distance, but still are reasonably certain to occur.
Interlocal Agreement	An interlocal agreement is a contract between government agencies.
Jeopardize	Defined by the ESA as “to engage in an action that reasonably will be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, number, or distribution of that species” (50 CFR § 402.02).
JLUS	Camp Bullis “Joint Land Use Study” prepared by the City of San Antonio and the U.S. Army with the input of local stakeholders to help ensure that economic growth is managed in a manner that allows the installation to achieve its mission and remain a vital contributor to the region’s economy.
Karst	A terrain characterized by landforms and subsurface features, such as sinkholes and caves, which are produced by solution of bedrock. Karst areas commonly have few surface streams and most water moves through cavities underground.
Karst Fauna Region (KFR)	KFRs are geographic areas delineated based on discontinuity of karst habitat that may reduce or limit interaction between populations of karst species.

Karst Zones	Geographic areas delineated based on geologic and topographic features that facilitate assessment of the probability of the presence of rare or endemic karst species. Potential karst habitat occurs in Karst Zones 1 through 4.
KFR Groups	Groups of SEP-HCP sectors that generally correspond to the region of one or more of the KFRs described in the Bexar County Listed Karst Invertebrates Recovery Plan.
Mitigation	Actions that compensate for the impacts of incidental take on a species.
National Environmental Policy Act (NEPA)	A United States environmental law that established a national policy promoting the enhancement of the environment. Establishes procedural requirements for all federal government agencies to prepare documentation evaluating the environmental impacts of proposed federal agency actions.
Occupied Cave Zone A	Includes the area within 345 feet of the entrance to a karst feature that is occupied by one or more of the Covered Karst Invertebrates. The extent of this zone encompasses approximately 8.5 acres around a feature.
Occupied Cave Zone B	Includes the area between 345 feet and 750 feet of the entrance to a karst feature occupied by one or more of the Covered Karst Invertebrates. This zone (in combination with Zone A) is intended to encompass all or most of the surface and subsurface resources needed to maintain the environmental integrity of an occupied karst feature.
Participant	Any non- federal entity, including private citizens, businesses, organizations, or state or local governments or agencies, that voluntarily obtains incidental take authorization for the Covered Species through the SEP-HCP.
Plan Area	The geographic extent of the SEP-HCP's operational conservation program. Includes 7 Texas counties: Bexar County, Bandera County, Blanco County, Comal County, Kendall County, Kerr County, and Medina County.
Preservation Credits	A Preservation Credit is generally equivalent to an acre of GCWA or BCVI habitat that is permanently protected and managed for the benefit of the respective species.
Preserve	Tracts of land used as mitigation for the taking of the Covered Species. Together the preserves form the "preserve system" or "preserve lands."

Southern Edwards Plateau Habitat Conservation Plan (SEP-HCP)	An effort by Bexar County, Texas and the City of San Antonio (the Applicants) to address endangered species issues that are threatening the economic growth of the region and promote the conservation of these species and related natural resources. The SEP-HCP supports an Endangered Species Act section 10(a)(1)(B) Incidental Take Permit from the U.S. Fish and Wildlife Service.
SEP-HCP Participants	Any non- federal entity, including private citizens, businesses, organizations, or state or local governments or agencies, that voluntarily participates in the SEP-HCP.
Take	As defined by the Endangered Species Act, “take” 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)).
Voluntarily Conserved Species	Species for which incidental take coverage will not be authorized, but for which targeted conservation measures will be voluntarily implemented as part of the SEP-HCP.

6.2 LIST OF ABBREVIATIONS

-A-	
AOG	Agency Oversight Group
-B-	
BAT	Biological Advisory Team
BCVI	Black-capped vireo (*Vireo atricapilla*); a Covered Species
BFZ	Balcones Fault Zone
-C-	
CAA	Clean Air Act of 1970
CAC	Citizens Advisory Committee
CAMPO	Capital Area Council of Governments
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
-D-	
dB	decibels
dBA	A-weighted decibels
-E-	
EAC	Early Action Compact
EIS	Environmental Impact Statement
EPA	US Environmental Protection Agency
ESA	Endangered Species Act of 1973
-F-	
FR	Federal Regulation
-G-	
GCWA	Golden-cheeked warbler (*Dendroica chrysoparia*); a Covered Species

-H-	
HCP	Habitat Conservation Plan
-I-	
-J-	
JLUS	Camp Bullis Joint Land Use Study
-K-	
KFR	Karst Faunal Region
-L-	
-M-	
MSATs	mobile source air toxics
-N-	
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act (42 USC § 4321 et seq.)
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NPS	National Park Service
NRI	National Rivers Inventory
-O-	
O_3	ozone
-P-	
Pb	lead
PM_{10} and $PM_{2.5}$	particulate matter 10 microns and particulate matter 2.5 microns
ppm	parts per million
-Q-	
-R-	
-S-	
SEP-HCP	Southern Edwards Plateau Habitat Conservation Plan
SH	State Highway
SIP	State Implementation Plan
SO_2	sulfur dioxide
-T-	
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TGPC	Texas Groundwater Protection Committee
THC	Texas Historical Commission
TNRIS	Texas Natural Resources Information Service
TPWD	Texas Parks and Wildlife Department
TSHA	Texas State Historical Association
TWDB	Texas Water Development Board
-U-	
SERVICE	United States Fish and Wildlife Service
-V-	
VOCs	volatile organic compounds
-W-	
WDA	Wendell Davis & Associates

CHAPTER 7

REFERENCES CITED

Beardmore, C. J. 1994. Habitat use of golden-cheeked warblers in Travis County, Texas. Master's Thesis, Texas A&M University, College Station, TX. 57 pp.

Bolger, D. T., T. A. Scott, and J. T. Rotenberry. 1997. Breeding bird abundance in an urbanizing landscape in coastal southern California. Conservation Biology 11(2): 406 – 421.

Campbell, L. 2003. Endangered and threatened animals of Texas: their life history and management. Texas Parks and Wildlife Department, Austin, Texas. 127 pp.

Cannizzo, James V. 2011. Letter to the Service, 17 August.

Chen, C.-C., D. Gillig, & B. A. McCarl, 2001, Impacts of Climatic Change on a Water Dependent Regional Economy—A Study of the Texas Edwards Aquifer: Climatic Change, v. 49, p. 397-409.

City of Austin. 2003. City of Austin 2004 golden-cheeked warbler and black-capped vireo monitoring program: Balcones Canyonlands Preserve Annual Report Fiscal Year 2002-03. Appendix E.

City of Austin. 2004. City of Austin 2004 golden-cheeked warbler (*Dendroica chrysoparia*) and black-capped vireo (*Vireo atricapilla*) monitoring program: Balcones Canyonlands Preserve Annual Report Fiscal Year 2003-04. Appendix E.

City of Austin. 2005. City of Austin 2005 golden-cheeked warbler (*Dendroica chrysoparia*) and black-capped vireo (*Vireo atricapilla*) monitoring program: Balcones Canyonlands

City of Austin. 2006. City of Austin 2006 golden-cheeked warbler (*Dendroica chrysoparia*) and black-capped vireo (*Vireo atricapilla*) monitoring program: Balcones Canyonlands Preserve Annual Report Fiscal Year 2005-06. Appendix F.

Claxton, Greg. (11 December 2009). Community Inventory: Natural Environment. In Imagine Austin. Retrieved from http://www.imagineaustin.net/

Coder, Dr. Kim D., "Identified Benefits of Community Trees and Forests", University of Georgia, October, 1996.

Coldren, C. L. 1998. The impacts of habitat fragmentation on the Golden-cheeked Warbler. Ph.D. diss, Texas A&M Univ., College Station, TX. 133 pp.

Collins, E.W., and S. D. Hovorka. 1997. Structure map of the San Antonio Segment of the Edwards Aquifer and Balcones Fault Zone, South-central Texas: Structural framework of a major limestone aquifer: Kinney, Uvalde, Medina, Bexar, Comal, and Hays Counties, Texas. The University of Texas, Bureau of Economic Geology. Miscellaneous Map No. 38, 14 pp. + 1 sheet.

Cooksey, M. L. and S. M. Edwards. 2008. Monitoring the golden-cheeked warbler and the black-capped vireo on Camp Bullis, Texas – 2008 field season report. Fort Sam Houston, Directorate of Public Works, Environmental Division. November 2008. 52 pp.

Council on Environmental Quality (CEQ). 1981. Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed Reg. 18026, 18027 (1981).

Culver, D. C. 1982. Cave Life. Evolution and Ecology. Harvard University Press, Cambridge, Massachusetts. 189 pp.

Cummins, T. 2006. The use of GIS and remotely sensed data in predicting the occurrence of two endangered avian species in central Texas. Thesis, Texas A&M University, College Station, Texas, USA.

Dearborn, D. C. and L. L. Sanchez. 2001. Do golden-cheeked warblers select nest locations on the basis of patch vegetation? The Auk. 118: 1052-1057.

DeBoer, T. S. and D. D. Diamond. 2006. Predicting presence-absence of the endangered golden-cheeked warbler (*Dendroica chrysoparia*). The Southwestern Naturalist. 51(2): 181-190.

Dixon, James. 2000. Amphibians and Reptiles of Texas, Second Edition. College Station: Texas A&M University Press.

Dufault, D. 2004. Habitat occupancy by the black-capped vireo (*Vireo atricapillus*) following prescribed burns at Kerr Wildlife Management Area. M.S. Thesis, Texas State University, San Marcos, Texas.

Elliott, W. R. and J. R. Reddell. 1989. The status and range of five endangered arthropods from caves in the Austin, Texas, region. A report on a study supported by the Texas Parks and Wildlife Department and Texas Nature Conservancy for the Austin Regional Habitat Conservation Plan. 100 pp.

Engels, T. M. 1995. The conservation biology of the golden-cheeked warbler (*Dendroica chrysoparia*). Ph.D. dissertation. University of Texas at Austin.

Engels, T. M., and C. W. Sexton. 1994. Negative correlation of blue jays and golden-cheeked warblers near an urbanizing area. Conservation Biology 8(1): 286-290.

EPA (United States Environmental Protection Agency). 1997b. Climate change in Texas. EPA 230-F-97-008qq. Washington, D.C.

EPA (United States Environmental Protection Agency). Heat Island Effect. Accessed at http://www.epa.gov/heatisld/ Updated 2009

ESRI Business Analyst Online (ESRI BIS). 2009. 2009 and 2014 demographics. http://www.esri.com/software/bao/index.html (see http://www.esri.com/data/esri_data/methodology-statements.html for methodology; Accessed November 8, 2010). ESRI, Redlands, CA.

Farquhar, C. C. and J. I. Gonzalez. 2005. Breeding habitat, distribution, and population status of the black-capped vireo in northern Mexico. Project WER65 Final Report. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Farrand, J., Jr. (ed.). 1983. The Audubon Society master guide to birding. 3 Vols. Alfred A. Knopf, New York. 1,244 pp.

Federal Register, Vol 59, No. 32, 1994. Retrieved from www.archives.gov/Federal-register/executive-orders/pdf/12898.pdf

Ferrill, D. A., D. W. Sims, D. J. Waiting, A. P. Morris, N. M. Franklin, and A. L. Schultz. 2004. Structural framework of the Edwards Aquifer recharge zone in south-central Texas. Geological Society of America Bulletin. 116(3/4): 407-418.

Friesen, L. E., P. F. J. Eagles, and R. J. Mackay. 1995. Effects of residential development on forest-dwelling neotropical migrant songbirds. Conservation Biology 9(6):1408 – 1414.

Gass, L. 1996. Nesting behavior of golden-cheeked warblers in Travis County, Texas. Master's Thesis, Southwest Texas State University, San Marcos, TX.

Gertsch, W. J. 1992. Distribution patterns and speciation in North American cave spiders with a list of the troglobites and revision of the *cicurinas* of the subgenus *Cicurella*. Texas Memorial Museum. Speleological Monographs 3: 75-122.

Graber, J. W. 1957. A bioecological study of the black-capped vireo (*Vireo atricapillus*). Ph.D. dissertation. University of Oklahoma, Norman, OK. 203 pp.

Graber, J. W. 1961. Distribution, habitat requirement, and life history of the black-capped vireo (*Vireo atricapilla*). Ecological Monographs. 31: 313-336.

Graber, A. E., C. A. Davis, and D. M. Leslie, Jr. 2006. Golden-cheeked warbler males participate in nest-site selection. The Wilson Journal of Ornithology. 118(2): 247-251.

Griffith, G. E., S. A. Bryce, J. M. Omernik, J. A. Comstock, A. C. Rogers, B. Harrison, S. L. Hatch, and D. Bezanson. 2004. Ecoregions of Texas (color poster with map, descriptive text, and photographs) (map scale 1:2,500,000). U.S. Geological Survey, Reston, Virginia.

Grzybowski, J. A. 1995. Black-capped vireo (*Vireo atricapillus*). In The Birds of North America, No. 181. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C.

Grzybowski, J. A., D. J. Tazik, and G. D. Schnell. 1994. Regional analysis of black-capped vireo breeding habitats. Condor. 96: 512-544.

Hegerl, G.C., F. W. Zwiers, P. Braconnot, N.P. Gillett, Y. Luo, J.A. Marengo Orsini, N. Nicholls, J.E. Penner and P.A. Stott, 2007: Understanding and Attributing Climate Change. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Heilbrun, R. D., A. Arnold, N. Lake, and D. Hisler. 2009. Habitat suitability model for evaluating City of San Antonio land donation for golden-cheeked warblers. Texas Parks & Wildlife Department PWD W7000-1685. Austin, Texas, USA. 19 pp.

Holimon, W. C. and R. A. Craft. 1999. Breeding density and productivity of the golden-cheeked warbler on Fort Hood, Texas in 1999. Pages 79 - 103 in Endangered species monitoring and management at Fort Hood, Texas: 1999 annual report. Fort Hood Project, The Nature Conservancy of Texas, Fort Hood, Texas.

Hovorka, S. D., R. E. Mace, and E. W. Collins. 1998. Permeability structure of the Edwards Aquifer, South Texas – Implications for Aquifer Management, Texas. The University of Texas at Austin, Bureau of Economic Geology. Report of Investigations No. 250. 55 pp.

Interagency Task Force on Economic Growth and Endangered Species. 2010. Balancing economy with ecology: a report to the Legislature from the Interagency Task Force on Economic Growth and Endangered Species. Texas Comptroller of Public Accounts. November 2010. http://www.texasahead.org/economic_developer/endangered_species/report/2010/96-1430_ESR.pdf

Jette, L. A., T. J. Hayden, and J. D. Cornelius. 1998. Demographics of the golden-cheeked warbler (*Dendroica chrysoparia*) on Fort Hood, Texas. U.S. Army Corps of Engineers. USACERL Technical Report 98/52. 82 pp.

Jiang, Yong; Swallow, Stephen K. 2007. Open space preservation, property value, and optimal spatial configuration. In: Burns, R.; Robinson, K., comps. Proceedings of the 2006 Northeastern Recreation Research Symposium; 2006 April 9-11; Bolton Landing, NY. Gen. Tech. Rep. NRS-P-14. Newtown Square, PA: US Department of Agriculture, Forest Service, Northern Research Station: 128-134. http://www.treesearch.fs.fed.us/pubs/12667 (accessed December 12, 2011).

Johnson, S., G. M. Schindel, and G. Veni. 2009. Tracing groundwater flowpaths in the Edwards Aquifer Recharge Zone, Panther Springs Creek Basin, northern Bexar County, Texas. Proceedings of the 15th International Congress of Speleology. p. 1538.

Jokimaki, J., and E. Huhta. 2000. Artificial nest predation and abundance of birds along an urban gradient. Condor 102:838-847.

Krejca, J. K. and F. W. Weckerly. 2007. Detection probabilities of karst invertebrates. Report prepared for Texas Parks and Wildlife Department and U.S. Fish and Wildlife Service.

Kroll, J. C. 1980. Habitat requirement of the golden-cheeked warbler: management implications. Journal of Range Management. 33: 60-65.

Kuniansky, E.L., L. Fahlquist, and A. F. Ardis. 2001. Travel times along selected flowpaths of the Edwards Aquifer, central Texas. U. S. Geological Survey. Water-Resources Investigation Report 01-4011. p. 69-77.

Ladd, C. G. 1985. Nesting habitat requirements of the golden-cheeked warbler. M.S. thesis. Southwest Texas St. Univ., San Marcos, Texas. 65 pp.

Ladd, C., and L. Gass. 1999. Golden-cheeked warbler (*Dendroica chrysoparia*). In The Birds of North America, No. 420 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA. 24 pp.

Le Treut, H., R. Somerville, U. Cubasch, Y. Ding, C. Mauritzen, A. Mokssit, T. Peterson and M. Prather, 2007: Historical Overview of Climate Change. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Lingren, R. J., A. R. Dutton, S. D. Hovorka, S. R. H. Worthington, and S. Painter. 2004. Conceptualization and simulation of the Edwards Aquifer, San Antonio Region, Texas. U. S. Geological Survey Scientific Investigations Report 2004-5277. 143 pp.

Lockwood, Mark W. and Brush Freeman. 2004. The Texas Ornithological Society Handbook of Texas Birds. Texas A&M University Press: College Station. 261 pp

Loomis Austin, Inc. 2008. Endangered species survey summary – Rancho Sierra, 2008. Prepared for Bury & Partners, Inc., Texas General Land Office, and Forestar Real Estate Group. Project No. 080402. 20 pp.

Loomis Partners, Inc. 2010a. Endangered species survey summary – Maverick Ranch, 2010. Prepared for The Nature Conservancy. Project No. 100318. July 23, 2010. 12 pp.

Mace, Robert E., and Shirley C Wade. (2008). In hot water? How climate change may (or may not) affect the groundwater resources of Texas: Gulf coast Association of Geological Societies Transactions, v. 58, p. 655-668. Retrieved from http://www.twdb.state.tx.us/gwrd/pdfdocs/2008_Mace_Wade-climate_change.pdf Majestic Ranch Arts Foundation and U.S. Fish and Wildlife Service (Service). 2010. Majestic Ranch Conservation Banking Agreement, executed November 17, 2010. 93pp.

Magness, D. R., R. N. Wilkins, and S. J. Hejl. 2006. Quantitative relationships among golden-cheeked warbler occurrence and landscape size, composition, and structure. Wildlife Society Bulletin. 34(2): 473-479.

Maresh, J. 2005. Census and monitoring of black-capped vireo in Texas. Final Report: Project WER61, Grant No. E-15. Texas Parks and Wildlife Department, Austin, Texas.

Matrix Design Group, Inc. 2009. Final Camp Bullis Joint Land Use Study. Prepared for the City of San Antonio and adopted by the City of San Antonio City Council on June 18, 2009. www.campbullisjlus.com. Last accessed August 10, 2011.

McConnell, V. Walls, M. 2005. The Value of Open Space: Evidence from studies of nonmarket benefits. Washington DC: Resource for Future.

McMahan, C. A., R. G. Frye, and K. L. Brown. 1984. The vegetation types of Texas -- including cropland. Texas Parks and Wildlife Department, PWD Bulletin 7000-120. Austin, Texas.

Mills, G. S., J. B. Dunning, Jr., and J. M Bates. 1989 Effects of urbanization on breeding bird community structure in southwestern desert habitats. Condor 91:416-428.

Mitchell, R. W. 1971. Preference responses and tolerance of the troglobitic carabid beetle Rhadine subterranean. Speleology. 3: 249-270.

Morrison, M. L., R. N. Wilkins, B. A. Collier, J. E. Groce, H. A. Mathewson, T. M. McFarland, A. G. Snelgrove, R. T. Snelgrove, and K. L. Skow. 2010. Golden-cheeked warbler population distribution and abundance. Texas A&M Institute of Renewable Natural Resources, College Station, Texas, USA. 194 pp.

National Wild & Scenic River. 2011. http://www.rivers.gov/publications.html#wsract

Natural Resources Conservation Service (NRCS). National Soil Survey Handbook Online. Part 622 Section 622.04, U.S. Department of Agriculture. http://soils.usda.gov/technical/handbook/contents/part622.html

Natural Resources Defense Council (NRDC). 2013. The Consequences of Global Warming on Weather Patterns. http://www.nrdc.org/globalWarming/fcons/fcons1.asp

Norris, C. W., D. W. Moulton, A. El-Hage, and D. Bradsby. 2005. Ecologically Significant River and Stream Segments of Region L (South Central) Regional Water Planning Area. Texas Parks and Wildlife Department Water Resources Technical Series WRTS-2005-01. 75 pp.

North American Bird Conservation Initiative. 2010. The state of the birds 2010: Report on climate change. U.S. Department of the Interior, Washington, DC. www.stateofthebirds.org; accessed May 25, 2010.

Oberholser, H.C. 1974. The bird life of Texas. 2 vols. University of Texas Press, Austin. 1,069 pp.

Palmer, A. N., and M. V. Palmer. 2009. Caves and Karst of the U.S.A. National Speleological Society. Huntsville, AL. p. 208-209.

Paquin, P. and M. Hedin. 2004. The powers and perils of “molecular taxonomy”: a case study of eyeless and endangered Cicurina (Araneae: *Dictynidea*) in central Texas caves. Molecular Ecology. 17pp.

Peak, R. G. 2005. Golden-cheeked warbler demography on Fort Hood, Texas. In Endangered species monitoring and management at Fort Hood: annual report. The Nature Conservancy, Fort Hood Project, Fort Hood, Texas, USA.

Peak, R. G. 2007a. Golden-cheeked warbler demography on Fort Hood, Texas. In Endangered species monitoring and management at Fort Hood: annual report. The Nature Conservancy, Fort Hood Project, Fort Hood, Texas, USA.

Peak, R. G. 2007b. Forest edges negatively affect golden-cheeked warbler nest survival. Condor. 109: 628 – 637.

Pulich, W. M. 1976. The golden-cheeked warbler: a bioecological study. Texas Parks and Wildlife Dept., Austin, Texas. 172 pp.

Reemts, C. M., C. Picinich, D. Cimprich, and R. G. Peak. 2008. Vegetation studies of black-capped vireo and golden-cheeked warbler habitat. Chapter 9 in Endangered species monitoring and management at Fort Hood, Texas: 2008 annual report. The Nature Conservancy, Fort Hood Project, Fort Hood, Texas, USA.

Reidy, J. L., M. M. Stake, and F. R. Thompson III. 2008. Golden-cheeked warbler nest mortality and predators in urban and rural landscapes. Condor. 110(3): 458-466.

Reidy, J. L., F. R. Thompson, III., and R. G. Peak. 2009. Factors affecting golden-cheeked warbler nest survival in urban and rural landscapes. Journal of Wildlife Management 73:407-413.

Rowell, G., M. Lockwood, and L. Campbell. 2002. Assessment of golden-cheeked warbler habitat characteristics on Texas Parks and Wildlife state parks. Texas Parks and Wildlife Department, Austin, Texas, USA.

San Antonio-Bexar County Metropolitan Planning Organization. Air Quality. Retrieved from http://www.sametroplan.org/Air_Quality/2010_ozone.html

Schindel, G.M., S. Johnson, and E. C. Alexander Jr. 2008. Hypogene processes in the Balcones Fault Zone Edwards Aquifer in south-central Texas, a new conceptual model to explain aquifer dynamics. Karst Waters Institute. Special Publication No. 14. p. 172.

Schmandt, Jurgen, Clarkson, Judith & North, Gerald R. The Impact of Global Warming on Texas. 2nd Edition, University of Texas Press, Austin. 2009

Schmidly, David J. 1994. The Mammals of Texas Revised Edition. University of Texas Press: Austin. 501 pp.

Service (United States Fish and Wildlife Service). 1991. Black-capped vireo (*Vireo atricapillus*) recovery plan. Albuquerque, New Mexico. 74 pp.

Service (United States Fish and Wildlife Service). 1992. Golden-cheeked warbler (*Dendroica chrysoparia*) recovery plan. Albuquerque, NM. 88 pp.

Service (United States Fish and Wildlife Service). 2003a. Designation of critical habitat for seven Bexar County, TX, invertebrate species – Final Rule. Federal Register 68:55063-55099.

Service (United States Fish and Wildlife Service). 2003b. Guidance for the establishment, use, and operation of conservation banks. Memorandum from the Director of the U.S. Fish and Wildlife Service to the Regional Directors – Regions 1 – 7. Dated May 2, 2003.

Service (United States Fish and Wildlife Service). 2005. Final programmatic biological opinion for the proposed implementation of the Military Mission and Associated Land Management Practices and Endangered Species Management Plan (ESMP) for the U.S. Army's Camp Bullis in Bexar County, Texas. Consultation #2-15-2002-F-0315. July 28, 2005. USFWS Austin Ecological Services, Austin, Texas. 36 pp.

Service (United States Fish and Wildlife Service). 2007. Black-capped vireo (*Vireo atricapilla*) 5-year review: summary and evaluation. U.S. Fish and Wildlife Service, Arlington, Texas. 26 pp.

Service (United States Fish and Wildlife Service). 2008. Draft Bexar County Karst Invertebrate Recovery Plan. U. S. Fish and Wildlife Service, Albuquerque, New Mexico. 125 pp.

Service (United States Fish and Wildlife Service). 2011c. Designation of critical habitat for nine Bexar County, Texas, invertebrates – Proposed Rule. Federal Register: February 22, 2011 (Volume 76, Number 35). Pages 9872-9937.

Service (United States Fish and Wildlife Service) and National Marine Fisheries Service (NMFS). 1996. Habitat Conservation Planning and Incidental Take Permit Processing Handbook. USFWS and NMFS, Washington, DC. November 1996.

Sexton, C. W. 2008. Draft Balcones Canyonlands National Wildlife Refuge compilation of warbler territory densities, 1997 – 2008. 2 pp.

Sherer PM. 2003. Parks for people: Why America needs more city parks and open space. San Francisco.

Sperry, C. 2007. Influences of borders on golden-cheeked warbler habitat in the Balcones Canyonlands Preserve, Travis County, Texas. M.S. Thesis. Texas State University – San Marcos. 67 pp.

Stake, M. M., J. Faaborg, and F. R. Thompson III. 2004. Video identification of predators at golden-cheeked warbler nests. Journal of Field Ornithology 75: 337-344.

SWCA Environmental Consultants. 2007. Preliminary deliverable – Golden-cheeked warbler status review. Prepared for Texas Department of Transportation, San Antonio District. May 1, 2007, Document 1502. 73 pp.

Taylor, S. J., J. K. Krejca, and M. L. Denight. 2005. Foraging range and habitat use of *Ceuthophilus secretus* (Orthoptera: *Thaphidophoridae*), a key trogloxene in central Texas cave communities. Am. Midl. Nat. 154:97-114.

Tazik, D. J. and J. D. Cornelius. 1989. The black-capped vireo on the lands of Fort Hood, Texas. Preliminary status report, Directorate of Engineering and Housing, Fort Hood, Texas.

Tazik, D. J., J. D. Cornelius, and C. Abrahamson. 1993. The black-capped vireo on the lands of Fort Hood, Texas. Volume I: distribution and abundance. TR EN-94/01. USACERL.

TCEQ (Texas Commission for Environmental Quality). 2009. Edwards Aquifer protection plans website. www.tceq.state.tx.us/compliance/field_ops/eapp/apps.html; accessed April 20, 2010.

TCEQ (Texas Commission for Environmental Quality). 2013. 2012 Texas Integrated Report – Texas 303(d) List (Category 5). http://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/12twqi/2012_303d.pdf; accessed January 15, 2014.

Texas Ground Water Protection Committee. 2013. Joint Groundwater Monitoring and Contamination Report – 2012. SFR-056/12. Jul 2013. www.tceq.texas.gov/assets/public/comm_exec/pubs/.../056-11.pdf (accessed January 27, 2014).

TPWD (Texas Parks and Wildlife Department). 2005. Texas Comprehensive Wildlife Conservation Strategy 2005 – 2010. Texas Parks and Wildlife Department. Austin, Texas.

TPWD (Texas Parks and Wildlife Department). 2007b. Ecologically Significant Stream Segments: Designation Criteria (31 TAC 357.8). Accessed June 14, 2010 at http://www.tpwd.state.tx.us/landwater/water/environconcerns/water_quality/sigsegs/.

TPWD (Texas Parks and Wildlife Department). 2010. Annotated County Lists of Rare Species: Bandera, Bexar, Blanco, Comal, Kendall, Kerr, and Medina counties. Updated March 12, 2010.

USCB (United States Census Bureau). 2000. Population, housing units, area, and density: 2000 (GCT-PH1). Census 2000 Summary File 1 (SF 1) 100-Percent Data. U.S. Census Bureau Fact Finder -- State by County. http://factfinder.census.gov/servlet/GCTTable?_bm=y&-geo_id=04000US48&-_box_head_nbr=GCT-PH1&-ds_name=DEC_2000_SF1_U&-format=ST-2. Accessed November 2, 2010.

USCB (United States Census Bureau). 2010. Race and Hispanic or Latino: 2010 - State -- County / County Equivalent. 2010 Census Redistricting Data (Public Law 94-171) Summary File (GCT-PL1). http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL1.ST05&prodType=table. Accessed March 31, 2011.

USCB (United States Census Bureau). 2010. 2010 Census, Table P5 – Hispanic or Latino Origin by Race and 2005 to 2009 5-year American Community Survey, Table C17002 – Ratio of Income to Poverty Level in the Past 12 Months

USDA (United States Department of Agriculture). National Forests and Grasslands in Texas, http://www.fs.usda.gov/detail/texas/about-forest/?cid=fswdev3_008427.

USFWS

Veni, G. 1994. Geologic controls on cave development and the distribution of endemic cave fauna in the San Antonio, Texas, region. Report prepared for Texas Parks and Wildlife Department and U.S. Fish and Wildlife Service, Austin, Texas. 112 pp.

Veni, G. 2002. Delineation of hydrogeologic areas and zones for the management and recovery of endangered karst invertebrate species in Bexar County, Texas. Report prepared for the U.S. Fish and Wildlife Service. 75 pp.

Wahl, R., D. D. Diamond, and D. Shaw. 1990. The golden-cheeked warbler: a status review. Prepared for the U.S. Fish and Wildlife Service, Fort Worth, Texas. 63 pp. plus appendices and maps.

Wendell Davis and Associates (WDA). 2010a. Population and housing projections for the Southern Edwards Plateau Habitat Conservation Plan. Version date: December 17, 2010. Prepared for Loomis Partners, Inc. Wendell Davis and Associates, San Antonio, TX.

Wendell Davis and Associates (WDA). 2010b. Preliminary land use projection scenarios for the Southern Edwards Plateau Habitat Conservation Plan. Version date: December 17, 2010. Prepared for Loomis Partners, Inc. Wendell Davis and Associates, San Antonio, TX.

Wharton, R. A., E. G. Riley, M. A. Quinn, J. B. Woolley, J. S. Schaffner, and H. R. Burke. 1996. Invertebrate species available as food for the golden-cheeked warbler in its nesting habitat. Report No. TX-96/1983-3F. Texas A&M University, Texas Transportation Institute; in cooperation with the Texas Department of Transportation. February 1996. 102 pp.

Whitney, G. D., and S. D. Adams. 1980. Man as maker of new plant communities. Journal of Applied Ecology 17:441-448.

Wilcove, D. S. 1985. Nest predation in forest tracts and the decline of migratory songbirds. Ecology 66(4): 1211 – 1214.

Wilkins, N., R. A. Powell, A. A. T. Conkey, and A. G. Snelgrove. 2006. Population status and threat analysis for the black-capped vireo. Department of Wildlife and Fisheries Sciences, Texas A&M University. Prepared for the U.S. Fish and Wildlife Service, Region 2. 146 pp.