

DRAFT
HABITAT CONSERVATION PLAN
FOR MAINTENANCE AND CONSTRUCTION
ACTIVITIES FOR THE
ONCOR ELECTRIC DELIVERY COMPANY, LLC

Prepared for:

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Habitat Conservation Plan for Maintenance and Construction Activities for the Oncor Electric Delivery Company, LLC

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Fish and Wildlife Service

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Abstract: Oncor Electric Delivery Company, LLC (Applicant) is applying for an incidental take permit under section 10(a)(1)(B) of the Endangered Species Act of 1973 (ESA), as amended, to authorize incidental take of 11 threatened or endangered species (covered species). In support of the incidental take permit application, the Applicant has prepared a habitat conservation plan (HCP) requesting a permit covering a 30-year period from the date of issuance. The area to be covered by the proposed HCP consists of the Applicant's Service Area (101 counties), with the exception of Travis and Williamson counties, which are covered by separate HCPs. In addition to the remaining 99 counties, 1 county that is not currently located in the Applicant's Service Area has been incorporated because they are currently included in various transmission line routing studies and permitting efforts. These 100 counties are referred to as the proposed Permit Area.

The requested permit would authorize incidental take for the 11 covered species resulting from a variety of activities associated with the maintenance and construction of the Applicant's electric transmission and distribution facilities (covered activities). Mitigation for the impacts of authorized take would be provided by the conservation program described in the HCP.

The HCP proposes use of a variety of avoidance and minimization efforts (for construction of new facilities and for operation and maintenance activities). Specific avoidance and minimization measures would be established for each of the covered species, and mitigation measures would be designated as appropriate. For all but one species (whooping crane [*Grus americana*]), mitigation funds would be

provided by the Applicant if incidental take cannot be avoided. These mitigation funds will be used to purchase mitigation credits from a Service-approved conservation bank or paid into accounts managed by a Service-approved third party such as The Nature Conservancy of Texas, Conservation Fund, and Lady Bird Johnson Wildflower Center. Committees would be set up for each species to determine how best to use the mitigation monies generated by the requested permit for the benefit of that species. A Service-approved time limit for spending the mitigation funds will be established. Potential uses include land acquisition and management, habitat management, and, to offset temporary take, research or monitoring. Any habitat that is acquired as result of these funds will be managed and protected for the applicable species in perpetuity. For the whooping crane, measures would be implemented to minimize the potential for collision with electric transmission lines. Mitigation for construction of new transmission facilities in areas with high potential for whooping crane presence would include marking existing lines in areas likely to be used by whooping cranes. Existing lines in high potential areas would be marked when lines are out of service for other activities, such as maintenance and repair.

The Applicant has the financial capability to ensure proper planning, management, and completion of the mitigation proposal as described in this HCP. Thus, the Applicant would fund the proposed avoidance and minimization measures, best management practices, and habitat mitigation costs. Within reason, the Applicant would complete negotiations, finalize all necessary agreements, and provide the mitigation costs prior to any significant clearing or construction activities in identified known or potential habitat with assumed presence. In the event that these agreements cannot be reasonably completed prior to the desired clearing and construction activities, the Applicant will arrange for an unconditional, irrevocable stand-by letter of credit to be issued to the Service by a nationally recognized banking institution in the amount of the expected mitigation cost to provide funding assurance.

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Executive Summary

INTRODUCTION AND AUTHORITY

This Habitat Conservation Plan (HCP) describes the potential impacts of the proposed issuance of an incidental take 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 Oncor Electric Delivery Company, LLC (Oncor or Applicant). The intention of the permit is to authorize incidental take of 11 federally listed species (covered species) within a 100-county Permit Area.

The Service is the lead Federal agency responsible for issuing the requested incidental take permit for this HCP. The affected area evaluated is the Applicant's proposed 100-county Permit Area. The requested permit duration is 30-years.

PURPOSE AND NEED

The purpose of this HCP is to allow a means by which the ESA compliance process for the Applicant's projects with the potential to impact protected species can be streamlined. The HCP and associated Environmental Impact Statement (EIS) specify what steps the Applicant will take to avoid, minimize, and compensate to the maximum extent practicable the potential impacts to the 11 covered species. Through this permit, the Applicant would establish and implement a long-term agreement with the Service for the protection of federally listed endangered and threatened species and their habitat within the proposed Permit Area, while allowing the Applicant to build and/or operate various facilities (e.g., transmission and distribution of electricity) and to perform subsequent facility integrity maintenance as well as emergency response work (covered actions).

The proposed permit and HCP are needed to allow the Applicant to continue to provide safe and reliable electricity while simultaneously maintaining the efficiency of its projects and operations and complying with the ESA.

ALTERNATIVES CONSIDERED

Pursuant to Section 10(a)(2)(a) of the Endangered Species Act, this HCP addresses alternatives considered but not adopted within the context of incidental take of covered species and provides justification for the Applicant's Preferred Alternative, which is presented in this HCP. A more detailed study of the environmental consequences of these alternatives is provided in the accompanying EIS. Alternatives considered in this HCP include a "no action," or project-based consultation (i.e., the Service does not issue the Applicant an incidental take permit and the Applicant coordinates with the Service on a project-by-project basis); Alternative 1: Proposed HCP – 30-year Permit Duration (Preferred Alternative); and Alternative 2: Proposed HCP – 50-year Permit Duration.

No-Action Alternative: Project-based Consultation – Under the No-Action Alternative, the Applicant would not be granted the requested incidental take permit covering all of their otherwise lawful activities

under the ESA. The Applicant would continue to conduct activities proposed to be covered under the permit, but without the assurance that such activities would be in compliance with the ESA and thus not be subject to “take.” Under this alternative, the Applicant would seek an individual section 10(a)(1)(B) incidental take permit or coverage under a section 7 consultation in the case of a Federal nexus (authorized by a Federal agency [e.g., section 404 permit under the Clean Water Act]) on a project-by-project basis if activities might result in incidental take of a federally listed species within the Service Area. Thus, under this scenario, numerous individual section 10(a)(1)(B) permit applications would likely be required over the 30-year period causing high resource expenditure and potential project delays for the Applicant and extensive resource commitment by the Service. The project-by-project approach to ESA compliance and endangered/threatened species issue resolution under the No-Action Alternative would be less efficient and more time-consuming, only to result in isolated, independent mitigation efforts that lack integration and would be smaller in scale. Such isolated mitigation would not be as productive or beneficial for the covered species as those under the proposed HCP alternative (Alternative 1, described below). Furthermore, cumulative impacts on individual projects may be more difficult to evaluate compared to Alternative 1.

Alternative 1: Proposed HCP – 30-year Permit Duration (Preferred Alternative) – Under this alternative, the Applicant would be issued a section 10(a)(1)(B) incidental take permit to authorize impacts to the covered species addressed in this HCP during the construction, operation, and/or maintenance of the Applicant’s transmission and distribution electrical facilities within the proposed Permit Area for a period of 30 years. The HCP contains specific steps for the covered activities proposed by the Applicant to be taken as part of the Preferred Alternative to avoid, minimize, and mitigate for impacts to the 11 covered species in the requested permit. The Applicant has identified and developed numerous conservation measures, including best management practices and species-specific measures that are intended to protect covered species during these covered activities. It is expected that the aforementioned measures could also minimize impacts to vegetation and wildlife, and protect sensitive areas such as wetlands, surface waters, groundwater resources, riparian areas, and other species of special interest. The HCP outlines specific avoidance and minimization measures for each of the covered species in addition to the general avoidance and minimization measures associated with new construction and maintenance of existing facilities. Covered activities authorized under the requested permit would include activities associated with new construction, operation and maintenance, and general activities, such as emergency response and restoration (e.g., electric facility outage), stormwater discharges from construction sites, equipment access, and surveying. The covered activities are expected to result primarily in incidental take of habitat for the federally listed species covered under the HCP except for the whooping crane, which would be an incidental take of individuals. Although it is possible that individual plants, American burying beetles, or Houston toads could be taken during some of the covered activities, it is not feasible to accurately quantify these predicted losses. Instead, the Applicant has proposed to account for potential loss of individuals by mitigating for impacts in unavoidable potential habitat for such species on an acreage basis. Therefore, incidental take for the covered species, except for the whooping crane, is expressed in terms of the area of potential habitat directly or indirectly impacted by

the covered activities. Incidental take of the whooping crane is expressed in terms of the number of individuals. These estimates reflect the maximum allowable take under the requested permit and the maximum values include a growth reserve to account for unidentified new construction of linear and nonlinear facilities.

Alternative 2: Proposed HCP – 50-year Permit Duration – Under this alternative, the proposed HCP and requested incidental take permit would be the same as described for Alternative 1, except that the duration of the permit and HCP would be over a 50-year period rather than a 30-year period. Covered activities would be the same, the proposed Permit Area would be the same, and the same species would be covered. The avoidance, minimization, and mitigation discussed in the proposed HCP would be the same, but would be implemented over a 50-year period. The only differences between alternatives 1 and 2 would be the duration over which incidental take would be permitted and an increased amount of requested take, which would account for the added permit duration and resultant construction, maintenance, and operation activities. Because the duration of the requested incidental take permit would be longer, the potential to conduct activities resulting in take would be higher, thus the anticipated take under Alternative 2 would be higher than under Alternative 1. Thus Alternative 2 was rejected.

SPECIES OF CONCERN IN THE PERMIT AREA

Two categories of federally protected species are addressed in this HCP: covered species and other species of special interest. Covered species are those for which incidental take authorization is being sought, while no take authorization is being sought for the other species of special interest.

- **Covered Species:** Eleven species are covered in this HCP. These species are listed as either federally threatened or endangered, and include four plants (large-fruited sand verbena, Texas poppy-mallow, Navasota ladies'-tresses, and Pecos sunflower), one invertebrate (American burying beetle), one amphibian (Houston toad), four birds (whooping crane, golden-cheeked warbler, black-capped vireo, and red-cockaded woodpecker), and one mammal (Louisiana black bear).
- **Other Species of Special Interest:** Other species of special interest include 13 federally listed and 1 species proposed for listing, as well as 15 candidate species, that occur in the proposed Permit Area but did not meet other criteria for being included as covered species, and for which no incidental take authorization is being requested, primarily because these species are unlikely to be affected by the covered activities. The 13 federally listed species consist of 2 plants, the endangered Texas prairie dawn-flower and a threatened plant with no common name; 2 endangered invertebrates, the Pecos assiminea snail and the Bee Creek Cave harvestman; 3 endangered fish, the Leon Springs pupfish, Comanche Springs pupfish, and Pecos gambusia; 1 reptile, the threatened Concho watersnake; and 5 birds, the endangered northern aplomado falcon, interior least tern, and southwestern willow flycatcher, and the threatened piping plover and Mexican spotted owl. The dunes sagebrush lizard has recently been proposed to be federally listed as endangered. The 15 candidate species consist of 3 plants, the Guadalupe fescue, Neches River rose-mallow, and Texas golden gladeceess; 5 aquatic invertebrates, the Phantom Lake Cave snail, Diamond Y Spring snail, Phantom Spring snail, Gonzales Spring snail, and diminutive

amphipod; 2 fish, the smalleye shiner and sharpnose shiner; 1 amphibian, the Salado salamander; 1 reptile, the Louisiana pinesnake; and 3 birds, the lesser prairie-chicken, Sprague's pipit, and yellow-billed cuckoo.

PERMITTED INCIDENTAL TAKE

Covered activities authorized under the requested permit would include activities associated with new construction, operation and maintenance, and general activities such as emergency response and restoration (e.g., electric facility outage), storm water discharges from construction sites, equipment access, and surveying. The covered activities are expected to result primarily in incidental take of habitat for the federally listed species covered under this HCP except for the whooping crane, which would be an incidental take of individuals. Although it is possible that individual plants, American burying beetles, or Houston toads could be taken during some of the covered activities, it is not feasible to accurately quantify these predicted losses. Instead, the Applicant has proposed to account for potential loss of individuals by mitigating for impacts in unavoidable potential habitat for such species on a habitat area basis. Therefore, incidental take for the covered species, except for the whooping crane, is expressed in terms of the number of acres of potential habitat directly or indirectly impacted by the covered activities. Incidental take of the whooping crane is expressed in terms of the number of individuals. These estimates reflect the maximum allowable take under the requested permit, and the maximum values include a growth reserve to account for unidentified new construction of linear and nonlinear facilities within the proposed Permit Area. The estimated incidental take for each covered species is presented in Table ES-1.

AVOIDANCE AND MINIMIZATION MEASURES

The ESA requires that the conservation program of an HCP include measures to minimize and mitigate impacts to the covered species to the maximum extent practicable. The Applicant has identified many conservation measures, including avoidance, minimization, and best management practices, to protect covered species and believe that these measures would also serve to minimize impacts to vegetation and wildlife, as well as to protect sensitive areas such as wetlands, surface waters, groundwater resources, riparian areas, and other species of special interest. These best management practices are designed to avoid/minimize potential impacts to covered species and, while some are standard practice for the Applicant, many are more comprehensive than typical operating procedures. The HCP includes specific avoidance and minimization measures for both new facilities and operation and maintenance of existing facilities.

SPECIES-SPECIFIC MEASURES AND MITIGATION

The HCP outlines specific avoidance and minimization measures for each of the covered species in addition to the general avoidance and minimization measures associated with new construction and maintenance of existing facilities.

Table ES-1. Acres (Hectares) of Requested Incidental Take Authorization for Covered Species

Common Name ¹	Scientific Name ¹	Service Status ²	Authorized Incidental Take Requested ³	
PLANTS				
Large-fruited sand-verbena	<i>Abronia macrocarpa</i>	E	5.5	(2.2)
Texas poppy-mallow	<i>Callirhoe scabriuscula</i>	E	64	(26)
Navasota ladies'-tresses	<i>Spiranthes parksii</i>	E	943	(382)
Pecos sunflower	<i>Helianthus paradoxus</i>	T	9	(3.6)
INVERTEBRATES				
American burying beetle	<i>Nicrophorus americanus</i>	E	3,972	(1,608)
AMPHIBIANS				
Houston toad	<i>Bufo houstonensis</i>	E	635	(257)
BIRDS				
Whooping crane ⁴	<i>Grus americana</i>	E		
Golden-cheeked warbler	<i>Dendroica chrysoparia</i>	E	2,997	(1,213)
Black-capped vireo	<i>Vireo atricapilla</i>	E	5,714	(2,313)
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	514	(208)
MAMMALS				
Louisiana black bear	<i>Ursus americanus luteolus</i>	T	194	(79)

¹Nomenclature follows the Service (2010).

²Service – U.S. Fish and Wildlife Service.

E – Endangered; T – Threatened.

³Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

⁴Potential effects not calculated on acreage basis. Estimated take of 1 individual over 30-year project life.

In the event that incidental take cannot be avoided, mitigation funds will be provided by the Applicant. These mitigation funds will be used to purchase credits from a Service-approved conservation bank, as appropriate, or paid into accounts managed by a Service-approved third party such as The Nature Conservancy of Texas, The Conservation Fund, and Lady Bird Johnson Wildflower Center. Committees will be set up for each species to determine the best use of the mitigation monies generated by the requested permit for the benefit of that species. The agreement with the third parties will include a Service-approved time limit for spending the mitigation funds. Potential uses include land acquisition (either by purchase or conservation easements) and management, habitat management, and, to offset temporary take, research or monitoring. Any habitat that is acquired as result of these funds will be managed and protected for the applicable species in perpetuity. The HCP outlines species-specific uses of these mitigation funds.

IMPLEMENTATION

All avoidance, minimization, and mitigation measures will be implemented by the Applicant and/or its contractors. Avoidance and minimization measures would be implemented as standard practice for maintenance activities and new line construction. The Applicant will include construction phase avoidance/minimization measures and best management practices on its construction plans and inspect all work by construction contractors to ensure adherence to the plans. When construction occurs in known

occupied habitat or potential habitat of any of the covered species, an onsite environmental monitor will be contracted to ensure adherence to all avoidance, minimization, and conservation measures and best management practices.

The Applicant's implementation responsibilities will include finalizing a contract and management agreement with a Service-approved third party or parties. All proposed agreements will be submitted to the Service for review and approval.

REPORTING

The Applicant will provide an annual report due to the Service on January 1 of each year documenting the activities and the Applicant's permit compliance for the previous year. This annual review will also allow the Applicant and the Service to evaluate the effectiveness of the avoidance/minimization measures and best management practices. Through adaptive management, newly acquired information and experience will be incorporated into future management plans and actions to address uncertainties and minimize risks. As new data become available, this approach will allow the Service and the Applicant to modify existing measures or develop alternative strategies that are acceptable to both parties in order to ensure attainment of the biological goals and the success of the HCP.

FUNDING

The Applicant has the financial capability to ensure proper planning, management, and completion of the mitigation proposal as described in the HCP. Thus, the Applicant would fund the proposed avoidance, minimization, and conservation measures and best management practices and habitat mitigation costs. Within reason, the Applicant would complete negotiations, finalize all necessary agreements, and provide the mitigation costs prior to any significant clearing or construction activities in known occupied habitat or potential habitat with assumed presence. The applicant has the financial capability to ensure proper planning, management, and completion of the mitigation proposals described in this HCP. Within reason, the Applicant will complete negotiations, finalize all necessary agreements, and provide mitigation funds prior to any significant vegetation clearing (i.e., results in take) or construction activities within identified covered species habitat.

In the event these agreements cannot be reasonably completed prior to the desired clearing and construction activities within covered species habitat, then the Applicant will arrange for a letter of credit to be issued to the Service in the amount of the expected mitigation cost. The letter of credit shall be issued by a nationally recognized banking institution having its principal place of business in the United States and shall have an expiration date that extends through the expected completion date of the mitigation measures or other date as mutually agreed upon. The letter of credit shall authorize and obligate the issuer to pay the designated organization upon demand (but in no case earlier than the later of (i) 60 days prior to the Service's expected commencement of substantial mitigation activities, or (ii) 15 days prior to the expiration of the letter of credit) by a draft against the letter of credit the amount determined as described in the HCP to fulfill and perform the mitigation work to the extent such

mitigation work has not been performed by the Applicant. Presentment by the Service or designated organization to the issuer of a sworn affidavit of the foregoing and a copy of the letter of credit shall accompany any demand made by the designated organization.

In the event that the letter of credit expires prior to the substantial completion of the required mitigation measures, the Applicant shall cause the issuer to issue an additional letter of credit to the designated organization (the “supplemental letter of credit”). The supplemental letter of credit shall be subject to the same terms as the letter of credit.

NO SURPRISES POLICY

The Service provides economic and regulatory assurances under the No Surprises policy (63 *Federal Register* 8859, codified at 50 Code of Federal Regulations [CFR] §§17.22, 17.32, 222.2) to incidental take Permittees, providing that an approved HCP is being properly implemented, that no additional land use restrictions or financial compensation will be required of the Permittee with respect to covered species, even if unforeseen circumstances arise after the permit is issued indicating that additional mitigation is needed. These assurances give Permittees certainty regarding the costs of mitigation and conservation of protected species.

The No Surprises rule recognizes that the Permittee and the Service can reasonably anticipate and plan for some changes in circumstances affecting a species or geographic area covered by an HCP. To the extent that changed circumstances are provided for in the HCP, the Permittee must implement the appropriate measures in response to the changed circumstances if and when they occur.

Potential changed circumstances included in the HCP are emergency repair, oak wilt, exceedance of whooping crane take due to ineffectual minimization and mitigation measures, Louisiana black bear repatriation, development of covered species habitat in newly created rights-of-way, new species becoming federally listed, covered species becoming delisted, covered species becoming extinct, and changed circumstances not provided for in the plan. Potential unforeseen circumstances are also covered in the HCP.

PERMIT AMENDMENT PROCEDURE

Amendments to the HCP and/or the associated incidental take permit may be necessary during the term of the permit. All amendments to the HCP or incidental take permit will require the consent of both the Applicant and the Service. The HCP outlines the procedures to be taken for both minor amendments and major amendments.

Minor amendments involve routine administrative revisions or minor changes to concepts contained within the HCP that do not diminish the level or means of avoidance, minimization, and/or mitigation of potential adverse impacts to listed species or increase the level of take. Minor amendments may be incorporated into the HCP and/or incidental take permit administratively, without formal NEPA analysis.

Major amendments are those that would substantially alter the effects of the covered projects or the conservation program. Incorporating major amendments may require completion of a formal amendment procedure similar to the original permit application process.

1.0 BACKGROUND

1.1 INTRODUCTION

Oncor Electric Delivery Company, LLC (Applicant) is a regulated electric distribution and transmission business providing reliable electricity delivery to consumers. The Applicant operates the largest distribution and transmission system in Texas, providing power to 3 million electric delivery points over more than 102,000 miles of distribution and 14,000 miles of transmission lines. The Applicant's Service Area within Texas currently consists of 101 counties. Throughout this document, the term Service Area refers to the Applicant's interest within the State of Texas only. The Applicant's ability to provide its services depends on the efficient installation, operation, and maintenance of numerous facilities within its Service Area. Currently, the Applicant's electric system includes electric transmission lines, electric substations, electric switching stations, and an electric distribution network. The location and type of new facilities to be constructed by the Applicant is dependent upon the service demands of its customers' requirements for energy and other related services.

Several federally listed endangered and threatened species are known or are likely to occur within the Service Area. The Applicant is applying for an incidental take permit from the U.S. Fish and Wildlife Service (Service) pursuant to section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended, for 11 of these species. The permit would authorize the incidental take of listed species in all but two of the counties within the Applicant's Service Area. Pursuant to section 10(a)(1)(B), the Applicant is submitting this Habitat Conservation Plan (HCP) to provide the required components as mandated by section 10 of the ESA. This HCP provides baseline information and estimates the amount of incidental take that may occur as a result of proposed activities under the Preferred Alternative during the requested permit term. The HCP also specifies how the impacts would be avoided, minimized, and mitigated to the maximum extent practicable. The accompanying Environmental Impact Statement (EIS) provides the required National Environmental Policy Act (NEPA) documentation for a Federal action (section 10(a)(1)(B) permit issuance).

1.2 PURPOSE AND NEED

The HCP has been prepared to support an application by the Applicant for an incidental take permit from the Service. The HCP will specify what steps the Applicant will take to avoid, minimize, and mitigate to the maximum extent practicable the potential impacts to the 11 covered species, thereby contributing to the species' long-term survival. Under provisions in the HCP and requested permit, the Applicant will establish and implement long-term protection of federally listed endangered and threatened species and their habitat within the proposed Permit Area, while it allows the Applicant to build and/or operate various facilities (e.g., transmission and distribution of electricity) and to perform subsequent facility integrity maintenance as well as emergency response work. In addition, this HCP and accompanying EIS together evaluate the environmental impacts of the Preferred Alternative.

The purpose of the proposed incidental take permit is to allow a means by which the Applicant can streamline the ESA compliance process for projects with the potential to impact protected species. Expediting the process would allow the Applicant to meet the energy needs within its Service Area, while allowing for ensured compliance with the ESA.

The Applicant's need for the proposed action (issuance of an incidental take permit) occurs when likelihood exists that endangered and threatened species could be affected by a maintenance or construction project. During such occurrences, project schedules and budgets are often impacted by lengthy field surveys, compliance coordination, and identification of appropriate mitigation. In consultation with the Service, it was determined that a permit allowing a maximum level of incidental take, granted in conjunction with this HCP, would help the Applicant continue to provide safe and reliable electricity while maintaining the efficiency of its projects and operations and preserving protected species and their habitat. The implementing regulations for section 10(a)(1)(B) of the ESA, as provided by 50 Code of Federal Regulations [CFR] 17.22, specify the criteria by which a permit allowing the incidental take of listed species pursuant to otherwise lawful activities may be obtained.

The Applicant has adopted a multispecies and habitat conservation approach rather than a species-by-species/project-by-project approach, since implementation of particular protective measures for one species may be deleterious to another. Such an approach would also eliminate the less-effective, more time-consuming, cumbersome, and costly alternative of obtaining Federal incidental take permits on a species-by-species and project-by-project basis, particularly since the proposed Permit Area consists of 100 counties and spans the jurisdictional boundaries of numerous local governments.

The benefits of this multispecies, multiproject HCP include the heightened awareness and avoidance of potential problems regarding endangered species issues; minimization of the impacts; and mitigation in cases where the impacts cannot be avoided, thereby meeting the Applicant's mission of protecting the environment while streamlining schedules. Management of mitigation funds by species-specific committees and purchase of conservation credits, where applicable, will ensure funding is used appropriately and to the maximum extent practicable so that species within managed habitats would benefit more than without the proposed incidental take permit. Such a concept would allow the potential to contribute aggregate mitigation funds to support more ambitious and beneficial conservation efforts or to preserve more contiguous habitat areas rather than the patchwork-quilt type effect that is likely to occur with the project-by-project scenario. Such conservation contributions would allow a better chance for a species' survival and recovery. This HCP defines the measures to be taken by the Applicant that will meet the requirements of a section 10(a)(1)(B) permit under the ESA.

1.3 PROJECT HISTORY

In June 2001, the Applicant met with Service representatives in Austin to discuss streamlining the ESA permitting process for activities within their Service Area. Due to the size of the Applicant's Service Area, the Service determined that the best way to authorize future projects with the potential for

incidental take would be to obtain an ESA section 10(a)(1)(B) incidental take permit for the entire Service Area. At this time, the Service advised the Applicant to proceed with preparing an Environmental Assessment (EA) to meet NEPA requirements because impacts that result from linear projects were considered minor in nature and not significant; therefore, an EIS would not be necessary.

PBS&J, the Applicant's technical consultant, developed a Preliminary Draft EA/HCP that was submitted to the Service in September 2003. The Service submitted their comments in May 2004. Comments were addressed and the revised document was submitted to the Service in November 2005. Another round of comments was received from the Service in April 2006, those comments were addressed, and the revised document submitted to the Service in December 2006. In April and May 2007, additional comments were received from the Service, including a decision made by the Service's Washington D.C. office that the project could not proceed with an EA and that an EIS would be necessary. In the last quarter of 2007, the Applicant made the decision not to pursue the project and efforts associated with preparing the EIS/HCP were halted. Approximately 1 year later, on October 8, 2008, the Applicant met with Service representatives in their Austin office to discuss reinitiating the ESA incidental take permitting process and resurrecting the EIS/HCP. Following their discussion, the Applicant initiated efforts to update and revise the NEPA document and began the NEPA process for an EIS.

On May 20, 2009, personnel from Oncor and PBS&J met with Service personnel Allison Arnold at the Service offices in Austin, Texas, to discuss options for moving forward with the incidental take permitting process and development of the EIS/HCP. A letter dated June 1, 2009, was submitted to the Service by the Applicant to announce their intent to move forward with the EIS/HCP process to apply for an incidental take permit. The letter provided information regarding the proposed covered activities, species, and counties included in the EIS/HCP, and a proposed timeline for major milestones throughout the permitting process.

The Preliminary Draft EIS/HCP was submitted to the Service in December 2009. Comments on the Preliminary EIS/HCP were received from the Service in April 2010. One of the comments was to prepare separate EIS and HCP documents rather than a combined EIS/HCP. The EIS was assigned to a new consultant solely responsive to the Service.

Throughout preparation of the HCP and EIS, including during the scoping period, Oncor, PBS&J, and the Service coordinated with one another regarding details of the proposed alternative and the process. Coordination occurred via email, teleconference, and in person at the Service's Austin field office (March, September, and October 2010). Additionally, species leads at the Service were contacted regarding determination of impacts, avoidance measures, mitigation options, and defining the No-Action Alternative.

The Preliminary Draft EIS/HCP was split into two separate documents (an EIS and an HCP) and additional comments were addressed. The revised documents were submitted to the Service in November 2010. Comments on the HCP were received in January 2011 and the revised document was submitted to

the Service in March 2011. Comments on the HCP from the Service's Regional Office were received in May 2011.

1.4 REGULATORY FRAMEWORK

1.4.1 Endangered Species Act

The ESA was passed by Congress in 1973. The purpose of the ESA is to protect and provide for the recovery of imperiled species and the ecosystems upon which they depend. The ESA is administered by the Service and the Commerce Department's National Marine Fisheries Service (NMFS). Terrestrial and freshwater organisms are the primary responsibility of the Service, while marine wildlife such as whales and anadromous fish such as salmon are the responsibility of NMFS.

Section 9 of the ESA prohibits the "take" of federally listed species of fish or wildlife unless authorized under the provisions of section 7 or section 10(a) of the ESA (16 United States Code [USC] § 1538(a)). Take, as defined by the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Harass is defined as "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." Harm is defined as "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 is defined as take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." A section 10(a)(1)(B) Permit would authorize the incidental taking of fish or wildlife otherwise prohibited by section 9.

Although section 9 of the ESA does not prohibit incidental take of federally listed plant species except under very specific conditions, the section 7(a)(2) prohibition against jeopardy does apply to plants. Since a section 10(a) permit is a Federal action, it is subject to the provisions under section 7(a)(2). Thus, plant species are included in this HCP.

If it is not feasible or practicable for a nonfederal entity to carry out an otherwise lawful land use activity so as to avoid take of a listed species, section 10(a)(1)(B) of the ESA (16 USC §1539(a)(1)(B)), authorizes the Service to issue an incidental take permit for nonfederal projects or activities that are not funded, authorized, or carried out by a Federal agency. The purpose of the incidental take permit is to authorize the incidental take of a listed species, not to authorize the activities that result in take. The permit also provides the Applicant protection from violation of the ESA and allows for impacts to the covered species, provided certain conditions are satisfied. One of these conditions is the preparation of a conservation plan (ESA (10)(a)(2)(A)).

An HCP is a planning document required as part of the application for an incidental take permit that describes the anticipated effects of the proposed taking; how those impacts will be minimized, or

mitigated; and how the HCP is to be funded. HCPs can apply to both listed and nonlisted species, including those that are candidates or have been proposed for listing. The purpose of the HCP process associated with the permit is to ensure there is adequate minimizing and mitigating of the effects of the authorized incidental take. Ultimately, the HCP provides for partnerships with nonfederal parties to conserve the ecosystems upon which listed species depend.

Section 7(a)(2) of the ESA requires all Federal agencies, in consultation with the Service, to ensure that any action “authorized, funded, or carried out” by that agency is “not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification” of critical habitat. Thus, a section 7 consultation occurs when an action proposed by another Federal Agency could result in incidental take of a species protected under the ESA. The results of the section 7 consultation are documented in a Biological Opinion prepared by the Service, including the conclusions regarding the likelihood of the proposed action to jeopardize the continued existence of, or result in destruction or adverse modification of designated critical habitat, for any listed species. The Service’s issuance of an incidental take permit is an action subject to the provisions of section 7 of the ESA. Therefore, to determine whether issuance of the proposed incidental take permit will jeopardize the continued existence of the listed species to be taken or result in the adverse modification of those species’ critical habitats, the Service must consult with itself. Prior to the issuance of the incidental take permit, the intra-service section 7 consultation must be concluded.

1.4.1.1 Benefits of an Incidental Take Permit and HCP

HCPs provide a framework for creative partnerships with the goal of reducing conflicts between listed species and economic development. By protecting habitat and preventing the decline of sensitive species, HCPs aid in efforts to recover species protected by the ESA. Conservation measures help maintain healthy ecosystems and valuable green space or protected species habitat. Mitigation for incidental take, as outlined in an HCP, can provide for preservation of habitat, management of existing habitat, or other measures to protect or reduce potential impacts to protected species. These measures can also contribute to the recovery of species and eventual removal from listing under the ESA.

The incidental take permit allows a permittee to legally proceed with an activity that would otherwise result in the illegal take of a listed species. The Service also developed a regulation to address the problem of maintaining regulatory assurances and providing certainty to permittees through the HCP process, the “No Surprises” regulation. This regulation assures permittees that if “unforeseen circumstances” arise, the Service will not require additional commitments beyond the level otherwise agreed to in the HCP without the consent of the permittee. Additional discussion of the No Surprises policy is presented in Section 10.

1.4.2 National Environmental Policy Act

Issuance of a section 10(a)(1)(B) incidental take permit is considered a major Federal action and is, therefore, subject to NEPA (42 USC 4321 et seq.). The primary purpose of a NEPA document is public

disclosure and to serve as a decision-making tool to ensure that the policies and goals defined in NEPA are incorporated into the ongoing programs and actions of the Federal government. A NEPA document provides full and fair discussion of potential project-related environmental impacts to the ecological and human environment. In addition, it will inform decision makers and the public of the reasonable and feasible alternatives that were considered in an effort to avoid or minimize adverse impacts, or enhance the quality of the human environment. It will be used by Federal officials in conjunction with other relevant material to plan actions and make decisions. The Service has determined that the proposed issuance of an incidental take permit to the Applicant should include preparation of an EIS to meet NEPA requirements.

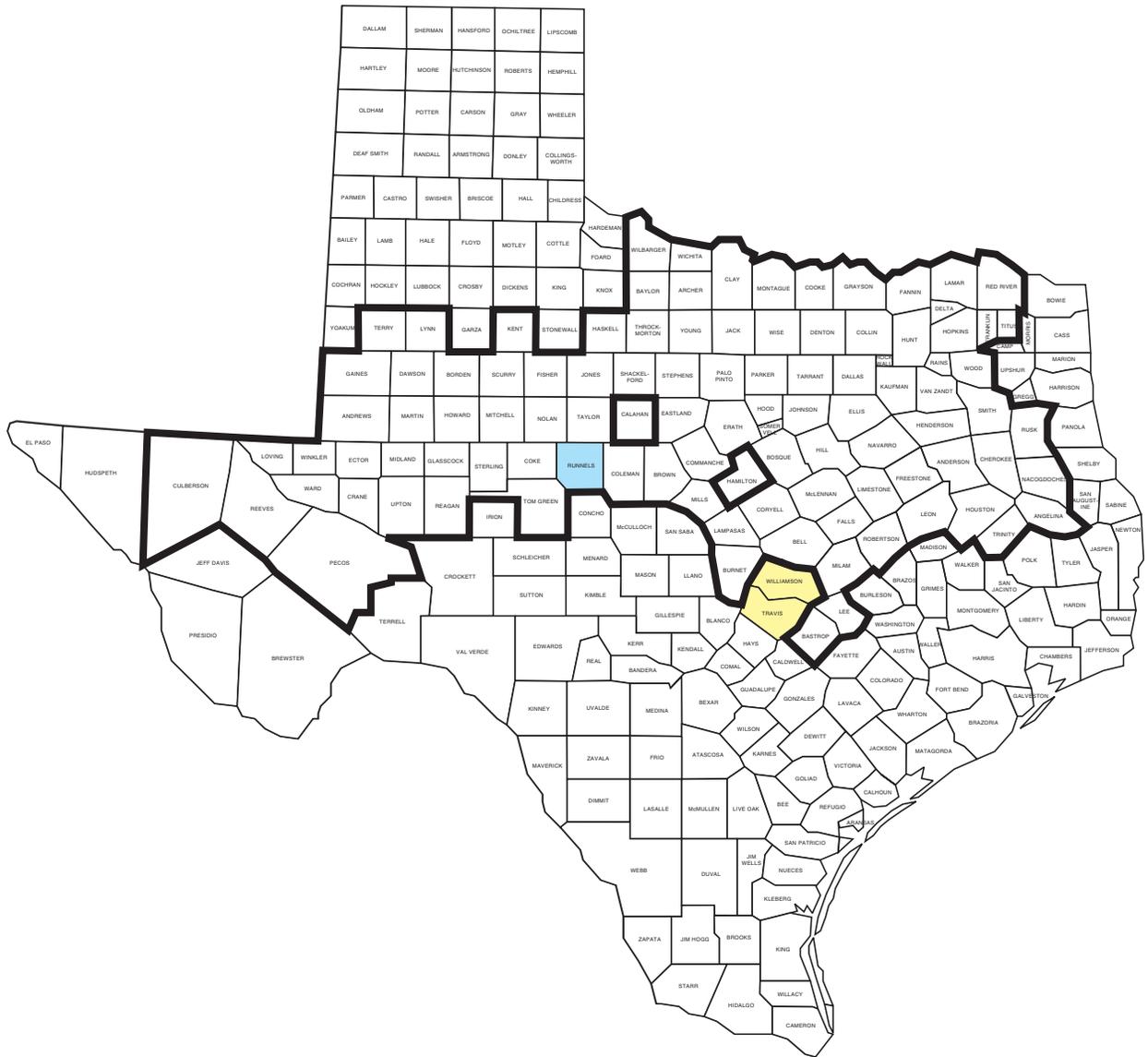
The Council on Environmental Quality (CEQ) was established by NEPA to formulate and recommend national policies that ensure the programs of the Federal government promote improvement of the quality of the environment. In doing so, the CEQ established regulations (40 CFR 1500-1508) to assist Federal agencies in implementing NEPA. These CEQ regulations will be used in conjunction with applicable Department of Interior and Service NEPA guidance documents to ensure that the environmental impacts of the proposed action are fully considered.

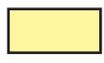
1.5 PROPOSED PERMIT AREA

The proposed area to be covered by the permit (proposed Permit Area) is the Applicant's entire Service Area within Texas, currently consisting of 101 counties, except for Travis and William

son Counties (Figure 1-1). Species in these two counties will be covered under the Balcones Canyonlands Conservation Plan and the Williamson County Regional HCP. In addition to the remaining 99 counties, the Applicant intends to include Runnels County, a county for which the Applicant currently does not provide service but that is included in current transmission line routing and permitting efforts. The Applicant is including Runnels County in its proposed Permit Area so that if the proposed future projects that include this county are approved, they would be covered under the incidental take permit for maintenance and, if this effort is completed in time and approved, for construction. Throughout this document, these 100 counties are referred to as the proposed Permit Area (see Figure 1-1). Should the Applicant's Service Area expand, either due to new construction or acquisition of existing facilities, the appropriate species and the newly expanded Service Area not addressed within this HCP will be added as necessary through the amendment process.

The proposed Permit Area is a 100-county area covering 8 of the 9 physiographic regions of Texas, 10 major river basins, most of Texas' major aquifers, 8 of the 10 vegetational regions of Texas, 6 of the 7 Biotic Provinces of Texas, and every type of land use ranging from undeveloped land to agricultural land to urban development. Numerous state parks and other preserved lands are also located within the proposed Permit Area. The population in the proposed Permit Area is approximately 11,325,299 persons (U.S. Census Bureau 2000), and the largest cities in the proposed Permit Area are Dallas, Fort Worth, Lubbock, Abilene, and Wichita Falls.



-  **The Applicant's Proposed Permit Area**
-  **Counties included in Oncor's Service Area but not the proposed Permit Area**
-  **County not currently in Oncor's Service Area but included in the proposed Permit Area**

PBS&J • Engineering
 • Environmental Consulting
 • Surveying

Figure 1-1
THE APPLICANT'S PROPOSED PERMIT AREA

Source: Oncor

I:\projects\hc1\oncor\100005805\cad\hpc_derek\figure1-1.ai

Because of its vast size, the proposed Permit Area displays significant diversity in habitat, resources, and degrees of urban development. Not all of the resources located within the proposed Permit Area could potentially be affected by the Preferred Alternative. While this HCP defines the measures to be taken by the Applicant that will meet the requirements of a section 10(a)(1)(B) permit under the ESA, the accompanying EIS briefly describes the existing resources within the proposed Permit Area, focusing primarily on those with the potential to be affected by the Preferred Alternative.

1.6 PERMIT DURATION

The requested duration of this section 10(a)(1)(B) permit is for 30 years from the date of issuance. This allows the Applicant or its successors to “take” the federally listed species covered in this document within the geographical boundaries identified in this HCP (i.e., the proposed Permit Area) over the 30-year period. After the expiration of this permit, any “take” within the proposed Permit Area requires reauthorization.

If, at the end of this 30-year period, the Applicant and the Service determine that it is prudent to extend or modify the HCP, additional opportunities for public review and comment will be provided. Renewal of the current section 10(a)(1)(B) permit may be sought at least 30 days prior to its expiration, in accordance with regulations in effect at that time under the following conditions (50 CFR 13.22): (1) the conservation measures established within the plan remain applicable and sufficient, unless amended as such; (2) incidental take maxima for each species remain the same as the original permit for the cumulative permit terms; and (3) the Applicant fulfills the requirements established in 50 CFR 13.21. The permit would remain in effect during review of the renewal application. Full analysis under NEPA is required for significant alterations, such as adding new species, to the original permit.

2.0 ALTERNATIVES

2.1 INTRODUCTION

Federal regulations under NEPA require that all reasonable alternatives to the Applicant's proposed action, including the No-Action Alternative, that meet the defined purpose and need for the project be examined (40 CFR 1502.14). Reasonable alternatives include those that are practical or feasible from a technical and economic perspective. Although it does not meet the purpose and need, analysis of the No-Action Alternative is needed to provide a benchmark against which potential effects of the action alternatives can be measured.

The development of action alternatives to meet the defined purpose and need for the project consisted of identification of five main components: counties covered, activities covered, species covered, mitigation options, and duration. Through this process, the Applicant developed action alternatives that could meet the described purpose and need, while also minimizing incidental take by reducing counties covered through compliance with existing HCPs, including only necessary activities and facilities, excluding federally listed species not likely to be affected by these activities, selecting comprehensive mitigation options that should provide the greatest benefits for each covered species, and determining an appropriate duration for the proposed HCP and requested incidental take permit. Three alternatives were developed: the No-Action Alternative: Project-based Consultation; Alternative 1: Proposed HCP – 30-year Permit Duration (Preferred Alternative); and Alternative 2: Proposed HCP – 50-year Permit Duration.

2.2 ALTERNATIVE 1: PROPOSED HCP WITH 30-YEAR PERMIT DURATION (PREFERRED ALTERNATIVE)

Alternative 1 is the issuance of a section 10(a)(1)(B) incidental take permit to authorize impacts to the covered species addressed in the HCP during the construction, operation, and/or maintenance of the Applicant's transmission and distribution electrical facilities within the proposed Permit Area for a 30-year period. This alternative was selected by the Applicant as the preferred alternative because it would allow development, operation, and maintenance of their facilities, thus allowing the Applicant to continue to provide reliable and affordable services to consumers, while minimizing potential impacts to the covered species, providing conservation/mitigation measures for these species, and maintaining compliance with the ESA.

Components of the electric system include transmission lines, substations, switching stations, and an electric distribution network. Access roads, both temporary and permanent, would be associated with these facilities. Mostly, overhead facilities are utilized in the transmission and distribution of electricity; however, some of these facilities are buried underground. The overhead wires are supported by wood, steel, or concrete poles. Substations connect the transmission lines to the distribution lines and function to reduce the electrical voltage to the distribution system.

The covered activities authorized under the requested permit would include general activities associated with new construction, maintenance, and activities such as emergency response and restoration (e.g., electric facility outage), stormwater discharges from construction sites, equipment access, and surveying. New construction activities would include construction of new overhead transmission and distribution lines and new support facilities such as substations and switching stations, addition of a second circuit on an existing double-circuit structure, and installation of underground electric lines. Typical maintenance activities would include vegetation management such as mowing and tree trimming/removal within rights-of-way, expansion of existing support facilities, line upgrade-reconductoring, line upgrade-rebuilds, insulator replacement, and maintenance of underground electric facilities. Covered actions are addressed in Section 4. These activities are required to provide adequate, reliable, and safe service to existing customers and to meet the demands of new growth.

Construction of new facilities would occur as a result of increased demand for services due to population growth within the proposed Permit Area. While the number of new facilities can be estimated based on historical data and anticipated growth, the exact locations of these facilities cannot be accurately determined at this time, since their need is market driven. Similarly, it is not possible to accurately determine where or when repairs to existing or future facilities would occur. It should be noted that under this alternative, the Applicant would continue to meet Electric Reliability Council of Texas (ERCOT) and Public Utility Commission of Texas (PUC) requirements for certification of facilities. Thus, each new facility would undergo a routing and constraints analysis to determine potential effects associated with the new facility and to effectively avoid and minimize negative impacts through the routing process.

An HCP has been developed as part of the Preferred Alternative. This HCP specifies what steps the Applicant would take to avoid, minimize, and mitigate the potential impacts to the 11 covered species to the maximum extent practicable. While the preferred form of mitigation is to purchase mitigation credits from a Service-approved conservation bank, for most species, compensatory mitigation would be paid for unavoidable take. These mitigation funds would be paid into accounts managed by a Service-approved third party such as The Nature Conservancy of Texas, The Conservation Fund, and Lady Bird Johnson Wildflower Center. Committees will be established as necessary for each species to determine how best to use the mitigation monies for the benefit of that species. Potential uses include land acquisition and management, habitat management on existing lands held for the conservation of the species, or, for temporary take, research or monitoring.

2.3 ALTERNATIVES CONSIDERED BUT NOT ADOPTED

Pursuant to Section 10(a)(2)(a), the ESA requires that HCPs include a description of “what alternative actions to such taking the applicant considered and the reasons why such alternatives are not being utilized.” Guidance provided by the HCP Handbook (Service and NMFS 1996) states that alternatives to the proposed action commonly considered are those that would reduce take below levels anticipated for the proposed action in addition to a “no action” alternative, where no permit is issued, take is avoided, and the project is not constructed or implemented. Furthermore, the Handbook notes that economic

considerations can be cited as a reason for rejecting project alternatives, such as when the effects on the applicant would be significantly adverse or economically infeasible, provided that data supporting this decision are provided (to the extent that it is reasonably available and nonproprietary). Moreover, selection of the alternative carried forward is at the applicant's discretion; however, the Service retains the authority to deny an application for an incidental take permit if it does not satisfy the requirements of the ESA.

Comprehensive development of the alternatives evaluation process included the identification of numerous alternatives that were not carried forward for further more-detailed analysis. Some of the dismissed alternatives would reduce take below the levels anticipated for the proposed action but were eliminated based on inherent flaws that precluded attainment of the described project purpose and need and/or presented exorbitant costs. The alternatives evaluation process consisted of identification of five main components: counties covered, activities covered, species covered, mitigation options, and permit duration. The process began by identifying which counties the Applicant would include in the HCP. Following identification of the appropriate counties to include, the Applicant determined which activities would be covered in the HCP. Once the counties and activities were identified, the Applicant had to determine which species would be included in the HCP for the incidental take permit. After identifying the species to be covered in the HCP, the Applicant reviewed potential mitigation options for each species, taking into consideration the potential effects associated with each of the covered activities. The final step in the development of alternatives was for the Applicant to determine an appropriate duration for the proposed HCP and requested incidental take permit.

Compliant to these Federal requirements and as noted above, the Applicant thoroughly evaluated three alternatives: (1) the No-Action Alternative under which compliance with the ESA would continue with issuance of section 10(a)(1)(B) incidental take permits, as necessary, on a project-by-project basis, (2) Alternative 1, the issuance of a comprehensive section 10(a)(1)(B) incidental take permit to authorize incidental take of the covered species during the Applicant's normal maintenance and construction activities (covered activities) within the proposed Permit Area over the 30-year permit duration, and (3) Alternative 2, the issuance of a section 10(a)(1)(B) incidental take permit to authorize incidental take of covered species during the Applicant's normal maintenance and construction activities (covered activities) within the proposed Permit Area for a 50-year duration. Alternative 1 is the Applicant's Preferred Alternative for which this HCP has been developed. The discussion below provides an overview of alternatives considered but rejected in the development of this HCP, and centers on incidental take of covered species. Explicitly stated are the Applicant's primary reasons for not implementing these rejected alternatives. Further description and more detailed analysis of all alternatives evaluated, including the Applicant's Preferred Alternative, for all significant resources is provided in the EIS accompanying this HCP.

2.3.1 No-Action Alternative: Project-based Consultation

Under the No-Action Alternative, the Applicant would not be granted the requested incidental take permit covering all of their otherwise lawful activities under the ESA. The Applicant would continue to conduct activities proposed to be covered under the permit, but without the assurance that such activities would be in compliance with the ESA and thus not be subject to “take.” Because construction of new facilities and maintenance activities of existing facilities are vital in providing services to accommodate population growth, these activities would continue. Through the normal construction, operation, and maintenance processes, the Applicant would continue to avoid impacting protected species habitat and, where this would not be possible, to minimize the potential impacts. Under this alternative, the Applicant would seek an individual section 10(a)(1)(B) incidental take permit or coverage under a section 7 consultation in the case of a Federal nexus (authorized by a Federal agency [e.g., section 404 permit under the Clean Water Act]) on a project-by-project basis over the next 30-year period if activities might result in incidental take of a federally listed species within the proposed Permit Area. Activities described in Section 4 would occur based on the need for maintenance of existing facilities and the need for construction of new facilities. Not all activities, however, would result in the necessity of an incidental take permit, or even informal consultation or coordination with the Service. Thus, under this scenario, numerous individual section 10(a)(1)(B) permit applications would likely be required over the 30-year period. This would be burdensome to both the Applicant and the Service, with time and effort being spent in obtaining/issuing numerous individual permits. Delays in construction of projects could jeopardize the Applicant’s ability to provide efficient, safe, and reliable services to its customers, resulting in additional costs to consumers. The project-by-project approach regarding endangered/threatened species issues under the No-Action Alternative would be more time-consuming, less efficient, and would result in isolated independent areas of mitigation. Such isolated mitigation would not be as productive or beneficial for the covered species as under the proposed HCP alternative (Alternative 1, described above). Furthermore, cumulative impacts on individual projects may be more difficult to evaluate compared to Alternative 1.

This No-Action Alternative was rejected based on the following conclusions:

- Delays in construction of projects could jeopardize the Applicant’s ability to provide efficient, safe, and reliable services to its customers, resulting in additional costs to consumers.
- A project-by-project approach regarding endangered/threatened species issues would be a more time-consuming and less efficient process for ESA compliance, encumbering both the Applicant and the Service.
- This alternative would only allow for project-by-project, piecemeal mitigation, incapable of providing comprehensive or comparable net benefits with respect to the proposed HCP. Such small-scale, isolated mitigation would not be as productive or beneficial for the species.
- Cumulative impacts on individual projects may be more difficult to evaluate.

2.3.2 Alternative 2: Proposed HCP with 50-year Duration

Alternative 2 is the issuance of a section 10(a)(1)(B) incidental take permit to authorize impacts to the covered species addressed in the HCP during the construction, operation, and/or maintenance of the Applicant's transmission and distribution electrical facilities within the proposed Permit Area for a 50-year period. Under this alternative, the duration of the permit and HCP would be over a 50-year period rather than a 30-year period; otherwise, the proposed HCP and requested incidental take permit would be the same as described for Alternative 1: covered activities would be the same; the proposed Permit Area would be the same; and the same species would be covered. The avoidance, minimization, and mitigation discussed in the proposed HCP would be the same, but would be implemented over a 50-year period. The only difference between alternatives 1 and 2 is the amount of take that would be requested and the duration over which such incidental take would be permitted. Because the duration of the requested incidental take permit would be longer, the potential to conduct activities resulting in take would be higher, thus the anticipated take under Alternative 2 would be higher than under Alternative 1. Thus, Alternative 2 was rejected.

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3.0 SPECIES OF CONCERN IN THE PERMIT AREA

3.1 EVALUATION OF SPECIES

Two categories of federally protected species are addressed in this HCP: covered species and other species of special interest. Covered species are those for which incidental take authorization is being sought, while no take authorization is being sought for the other species of special interest. The following describes the process through which the Applicant identified species to be covered by the proposed incidental take permit and those that would not be covered.

The Applicant recognizes the importance of protecting candidate species; however, it is not practical to try to include all of these species that occur within the 100-county Permit Area in the proposed incidental take permit. Candidate species are those species for which enough information about their vulnerability and threat(s) is available to propose them for listing as endangered or threatened. However, they are typically precluded from listing by higher priority listing activities. Therefore, the Applicant elected to include only those species listed by the Service as threatened or endangered under the ESA. However, candidate species that occur within the proposed Permit Area are considered in this HCP as other species of special interest and are addressed in sections 3.3 and 5.3.

Criteria were defined by the Applicant to determine which species would be covered by the proposed permit. Those criteria are as follows:

- Species listed by the Service as either Threatened or Endangered;
- Species identified by the Service as potentially occurring within the proposed Permit Area counties;
- Species not considered extremely rare (located within isolated, specialized habitats or occurring in extremely small numbers, thus reducing the chance to encounter individuals or habitats) or extirpated within the Permit Area county;
- Species potentially affected by covered activities; and
- Species for which impacts cannot be avoided through use of BMPs.

Based on evaluation using the above criteria of all species listed as threatened or endangered under the ESA and that occur within the proposed Permit Area, the Applicant has decided to include 11 covered species in this HCP and on its requested section 10(a)(1)(B) incidental take permit. Evaluation criteria for these 11 covered species and other federally listed species are shown in Table 3-1. As noted earlier, these 11 species are referred to as covered species and the proposed activities as covered projects or covered activities when subject to Federal authority. Species that were excluded from the requested permit are either not likely to be affected by covered projects or occur in portions of counties where the Applicant does not have facilities. These species are addressed in Section 3.3 as other species of special interest.

Table 3-1. All Species Listed Under the ESA as Threatened or Endangered and that Occur Within the Proposed Permit Area with Display of Evaluation Criteria for Covered Species

Common Name	Scientific Name	Criteria					Included as Covered Species
		Federally-Listed T/E	Occurs in Permit Area	Potential to Encounter Within Permit Area	Potentially Affected by Covered Activities	Potential for Take Cannot be Eliminated with BMPs	
Plants							
(No common name)	<i>Geocarpon minimum</i>	✓	✓				N
Large-fruited sand-verbena	<i>Abronia macrocarpa</i>	✓	✓	✓	✓	✓	Y
Navasota ladies'-tresses	<i>Spiranthes parksii</i>	✓	✓	✓	✓	✓	Y
Pecos sunflower	<i>Helianthus paradoxus</i>	✓	✓	✓	✓	✓	Y
Texas poppy-mallow	<i>Callirhoe scabriuscula</i>	✓	✓	✓	✓	✓	Y
Texas prairie dawn-flower	<i>Hymenoxys texana</i>	✓	✓				N
Invertebrates							
Bee Creek Cave harvestman	<i>Texella reddelli</i>	✓	✓				N
American burying beetle	<i>Nicrophorus americanus</i>	✓	✓	✓	✓	✓	Y
Pecos assiminea snail	<i>Assiminea pecos</i>	✓	✓				N
Amphibians/Reptiles							
Houston toad	<i>Bufo houstonensis</i>	✓	✓	✓	✓	✓	Y
Concho water snake	<i>Nerodia paucimaculata</i>	✓	✓				N
Fishes							
Comanche Springs pupfish	<i>Cyprinodon elegans</i>	✓	✓				N
Leon Springs pupfish	<i>Cyprinodon bovinus</i>	✓	✓				N
Pecos gambusia	<i>Gambusia nobilis</i>	✓	✓				N
Birds							
Black-capped Vireo	<i>Vireo atricapilla</i>	✓	✓	✓	✓	✓	Y
Golden-cheeked warbler	<i>Dendroica chrysoparia</i>	✓	✓	✓	✓	✓	Y
Interior least tern	<i>Sterna antillarum</i>	✓	✓				N

Table 3-1 (Cont'd)

Common Name	Scientific Name	Criteria					Included as Covered Species
		Federally-Listed T/E	Occurs in Permit Area	Potential to Encounter Within Permit Area	Potentially Affected by Covered Activities	Potential for Take Cannot be Eliminated with BMPs	
Mexican spotted owl	<i>Strix occidentalis lucida</i>	✓	✓				N
Northern aplomado falcon	<i>Falco femoralis septentrionalis</i>	✓	✓				N
Piping plover	<i>Charadrius melodus</i>	✓	✓				N
Red-cockaded woodpecker	<i>Picoides borealis</i>	✓	✓	✓	✓	✓	Y
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	✓	✓				N
Whooping crane	<i>Grus americana</i>	✓	✓	✓	✓	✓	Y
Mammals							
Louisiana Black bear	<i>Ursus americanus luteolus</i>	✓	✓	✓		✓	Y

T = Listed under ESA as Threatened; E = Listed under ESA and Endangered; BMP = best management practices; Y = Yes; N = No.

Reasons for not including these species in the requested section 10(a)(1)(B) permit are discussed in sections 3.3 and 5.3. Other species of special interest are shown in Table 3-2.

Other species of special interest include 13 federally listed species and 1 species proposed for listing, as well as 16 candidate species, that occur in the proposed Permit Area but did not meet other criteria for being included as covered species. These include the federally endangered Texas prairie dawn-flower (*Hymenoxys texana*), Pecos assiminea snail (*Assiminea pecos*), Bee Creek Cave harvestman (*Texella reddelli*), Leon Springs pupfish (*Cyprinodon bovinus*), Comanche Springs pupfish (*Cyprinodon elegans*), Pecos gambusia (*Gambusia nobilis*), northern aplomado falcon (*Falco femoralis septentrionalis*), interior least tern (*Sterna antillarum*), and southwestern willow flycatcher (*Empidonax traillii extimus*); the federally threatened plant (*Geocarpon minimum*), Concho watersnake (*Nerodia paucimaculata*), piping plover (*Charadrius melodus*), and Mexican spotted owl (*Strix occidentalis lucida*); the proposed federally endangered dunes sagebrush lizard (*Sceloporus arenicolus*); and 15 Federal candidate species (see Table 3-2).

The Applicant believes that impacts to many of the species categorized as other species of special interest can be avoided through avoidance, minimization, and conservation measures and by using BMPs, as established in the Conservation Program (Section 6) of this document. Additionally, many of these species have limited distribution or are only transients within the proposed Permit Area and the likelihood of affecting these species during normal maintenance or construction activities is extremely low. Furthermore, measures taken under the HCP Conservation Program (Section 6) for the covered species may collaterally benefit these other species of special interest. Therefore, the Applicant is not currently seeking incidental take authorization for any of these other species of special interest, and take of these species would not be authorized by issuance of the requested permit.

3.2 COVERED SPECIES

The Applicant has decided to include 11 species in this HCP and on its requested section 10(a)(1)(B) incidental take permit. As noted earlier, these 11 species are referred to as covered species and the proposed activities as covered projects or covered activities when subject to Federal or state authority. Species that were excluded from the requested permit are either not likely to be affected by the Applicant's projects or occur in portions of counties where the Applicant does not have facilities. These species and their reasons for not being included in the requested section 10(a)(1)(B) permit are addressed in Section 3.3. Table 3-3 contains a list of the species to be included in the requested section 10(a)(1)(B) permit and their level of Federal protection. The following sections provide a description of each covered species.

Table 3-2. Other Species of Special Interest

Common Name	Scientific Name	Counties of Occurrence Within Proposed Permit Area	Federal Listing Status
THREATENED OR ENDANGERED SPECIES			
Plants			
Texas prairie dawn-flower	<i>Hymenoxys texana</i>	Lamar, Trinity	E
(No common name)	<i>Geocarpon minimum</i>	Anderson	T
Invertebrates			
Pecos assiminea snail	<i>Assiminea pecos</i>	Pecos, Reeves	E
Bee Creek Cave harvestman	<i>Texella reddelli</i>	Burnet	E
Fish			
Leon Springs pupfish	<i>Cyprinodon bovinus</i>	Pecos	E
Comanche Springs pupfish	<i>Cyprinodon elegans</i>	Reeves	E
Pecos gambusia	<i>Gambusia nobilis</i>	Pecos, Reeves	E
Reptiles			
Concho watersnake	<i>Nerodia paucimaculata</i>	Brown, Coke, Coleman, Lampasas, McCulloch, Mills, Mitchell, Runnels, San Saba, Tom Green	T
Birds			
Northern aplomado falcon	<i>Falco femoralis septentrionalis</i>	Reeves	E
Interior least tern	<i>Sterna antillarum</i>	Bowie, Clay, Cooke, Dallas, Delta, Denton, Fannin, Freestone, Grayson, Hopkins, Kaufman, Lamar, Leon, Limestone, Milam, Montague, Rains, Red River, Tarrant, Throckmorton, Tom Green, Wichita, Wilbarger, Wood	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	Culberson	E
Piping plover	<i>Charadrius melodus</i>	Dallas, Delta, Denton, Grayson, Throckmorton	T
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Culberson	T
PROPOSED FOR LISTING			
Dunes sagebrush lizard	<i>Sceloporus arenicolus</i>	Andrews, Crane, Gaines, Ward, Winkler	PE
CANDIDATE SPECIES			
Plants			
Guadalupe fescue	<i>Festuca ligulata</i>	Culberson	C
Neches River rose-mallow	<i>Hibiscus dasycalyx</i>	Cherokee, Houston, Trinity	C
Texas golden gladeceess	<i>Leavenworthia texana</i>	Nacogdoches	C

Table 3-2 (Cont'd)

Common Name	Scientific Name	Counties of Occurrence Within Proposed Permit Area	Federal Listing Status
Invertebrates			
Phantom Lake cave snail	<i>Cochliopa texana</i>	Reeves	C
Diamond Y Spring snail	<i>Pseudotryonia (=Tryonia) adamantina</i>	Pecos	C
Phantom springsnail (=Tryonia)	<i>Tryonia cheatumi</i>	Reeves	C
Gonzales springsnail	<i>Tryonia circumstriata (=stocktonensis)</i>	Pecos	C
Diminutive amphipod	<i>Gammarus hyalleloides</i>	Reeves	C
Fish			
Smalleye shiner	<i>Notropis buccula</i>	Baylor, Bell, Bosque, Fisher, Haskell, Hill, Kent, Palo Pinto, Throckmorton, Young	C
Sharpnose shiner	<i>Notropis oxyrhynchus</i>	Baylor, Bosque, Fisher, Haskell, Hill, Kent, Milam, Palo Pinto, Robertson, Somervell, Throckmorton, Young	C
Amphibians			
Salado salamander	<i>Eurycea chisholmensis</i>	Bell	C
Reptiles			
Louisiana pinesnake	<i>Pituophis ruthveni</i>	Angelina, Cherokee, Nacogdoches, Wood	C
Birds			
Lesser prairie-chicken	<i>Tympanuchus pallidicinctus</i>	Andrews, Gaines, Terry	C
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Culberson	C
Sprague's Pipit	<i>Anthus spragueii</i>	Statewide ¹	C

¹The Service's website (<http://www.fws.gov/endangered/>) currently lists this species as occurring Statewide since it is still going through the review process. This species is also not listed on the Service's Southwest Region website (<http://www.fws.gov/southwest/es/EndangeredSpecies/lists/>). July 2011.

E – Endangered; T – Threatened; PE – Proposed for Listing as Endangered; C – Candidate for Federal listing.

Table 3-3. Covered Species in the Applicant's Proposed Permit Area¹

Common Name ²	Scientific Name ²	Service Status ³
PLANTS		
Large-fruited sand-verbena	<i>Abronia macrocarpa</i>	E
Texas poppy-mallow	<i>Callirhoe scabriuscula</i>	E
Navasota ladies'-tresses	<i>Spiranthes parksii</i>	E
Pecos sunflower	<i>Helianthus paradoxus</i>	T
INVERTEBRATES		
American burying beetle	<i>Nicrophorus americanus</i>	E
AMPHIBIANS		
Houston toad	<i>Bufo houstonensis</i>	E
BIRDS		
Whooping crane	<i>Grus americana</i>	E
Golden-cheeked warbler	<i>Dendroica chrysoparia</i>	E
Black-capped vireo	<i>Vireo atricapilla</i>	E
Red-cockaded woodpecker	<i>Picoides borealis</i>	E
MAMMALS		
Louisiana black bear	<i>Ursus americanus luteolus</i>	T

¹According to the Service (2010).

²Nomenclature follows the Service (2010).

³Service – U.S. Fish and Wildlife Service.

E – Endangered; T – Threatened.

3.2.1 Plants

3.2.1.1 Large-Fruited Sand-Verbena (*Abronia macrocarpa*)

Status: Endangered (53 *Federal Register* 37975, 28 September 1988) without critical habitat.

Description: A member of the four-o'clock family (Nyctaginaceae), the large-fruited sand-verbena is a herbaceous, taprooted perennial that blooms from March through June, opening its flowers in the afternoon and closing them by early morning. Its stems branch at the base and may be erect or spreading to about 20 inches or 51 centimeters in length, with opposite, ovate leaves about 2 inches (5 centimeters) in length. Both the leaves and stems are covered with glandular trichomes, or hairs. The flowers of the large-fruited sand-verbena are trumpet-shaped with five indented lobes, pink to purple in color, and up to 1.25 inches (3.2 centimeters) long. About 20 to 75 individual flowers comprise the plant's rounded inflorescence. Its fruits have five papery-thin wings, somewhat resembling a turbine, each holding a single, small, brownish black seed. These large, papery fruits distinguish this species from other similar members of the *Abronia* genus. The plants typically die back after flowering in June, until a basal rosette appears in October, which remains until early spring when the plant matures (Poole and Riskind 1987, Texas Parks and Wildlife Department 1996a).

Habitat: All populations of the large-fruited sand-verbena occur on deep, Eocene-Age sands, such as the Padina and Arenosa series. As previously noted, these soils are commonly known as sugar sands or blowout sands because of their susceptibility to wind erosion and dune formation. The large-fruited sand-verbena is restricted to sparsely vegetated openings, including active blowouts, in the post oak woodland/grassland mosaic found in the Post Oak Savannah Vegetational Area (Hatch et al. 1990, Texas Organization for Endangered Species 1993, Texas Parks and Wildlife Department 1996a). Species commonly associated with this flowering plant include Indian blanket (*Gaillardia* sp.), goldenmane coreopsis (*Coreopsis basalis*), silver croton (*Croton argyranthemus*), and angled hedeoma (*Rhododon ciliatus*) (Poole and Riskind 1987). Yaupon, milkweed (*Asclepias* sp.), and grape (*Vitis* sp.) are also considered important components of its habitat since they are known food sources for the larvae of moths in the families Sphingidae and Noctuidae believed to pollinate the large-fruited sand-verbena (Williamson et al. 1994).

Range: The distribution of the large-fruited sand-verbena is limited to nine populations within three Texas counties: Freestone, Leon, and Robertson. The number of individual plants within each population ranges from approximately 750 at one site in Robertson County to 30,000 at a site in Leon County (Center for Plant Conservation 2009, Poole et al. 2004, Service 1992a, 2010, Texas Parks and Wildlife Department 1996a).

Distribution in the Proposed Permit Area: All known populations of the large-fruited sand-verbena occur within counties included in the Applicant's proposed Permit Area (Figure 3-1).

Reason for Decline: Residential, resort, and oil well construction exhibit the greatest threat to the large-fruited sand-verbena, since they have resulted in the permanent elimination of much of its habitat. Conversion of sand-verbena habitat to pasture grasses, such as bermudagrass (*Cynodon dactylon*), lovegrass (*Eragrostis* sp.), and winter annuals, is another cause of habitat loss or modification, as it leads to increased ground cover and, ultimately, soil stabilization. Additionally, the suppression of natural fires has caused woody species to encroach upon the open, sandy areas occupied by this species (53 *Federal Register* 37976, Texas Parks and Wildlife Department 1996a).

3.2.1.2 Texas Poppy-Mallow (*Callirhoe scabriuscula*)

Status: Endangered (46 *Federal Register* 3184, 13 January 1981) without critical habitat.

Description: The Texas poppy-mallow is a showy wildflower that branches basally, if at all, and stands erect, reaching a height of 10 to 50 inches (25 to 127 centimeters). Its stems and leaves are covered with microscopic, stellate hairs making this plant rough to the touch. The alternate leaves are deeply palmate with three to five lobes, and their margins are smooth or with few teeth. Its chalice-like flowers are reddish purple, deepening to dark red or maroon toward the base of its five petals, and each petal is fringed along its top edge. The poppy-mallow's flowers bloom in late April to mid-June and are open

each day from a few hours after sunrise to sunset for up to eight days or until they are fertilized by bees or other flying insects. This perennial dies back during winter, existing as a small, basal rosette with 3 to 8 leaves (Poole and Riskind 1987, Texas Parks and Wildlife Department 1996b).

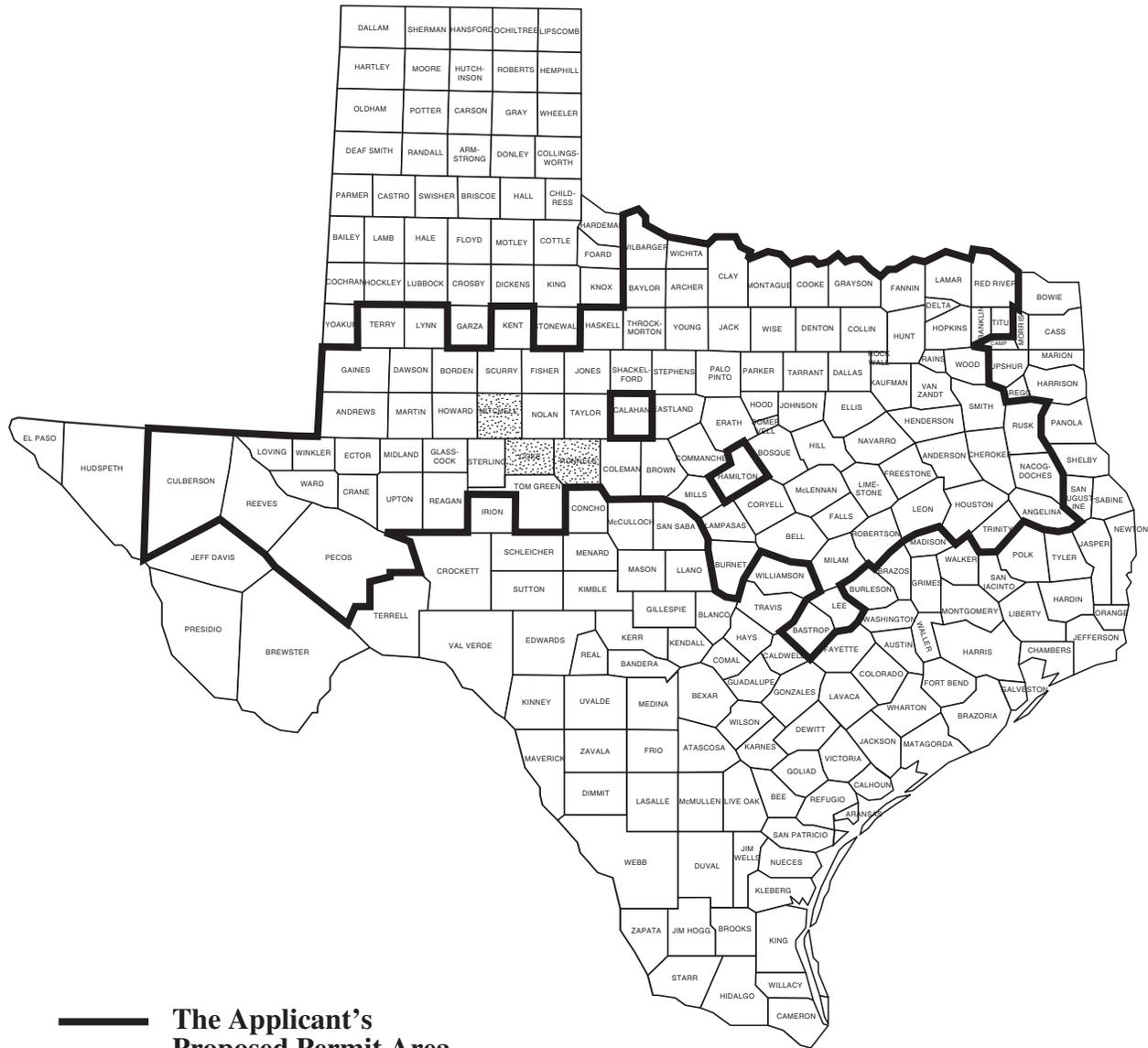
Two other winecup species similar to the Texas poppy-mallow have ranges that overlap with this endangered species. The petals of low poppy-mallow (*Callirhoe involucrata*) and tall poppy-mallow (*Callirhoe leiocarpa*) become white at the center toward the base of the flower, and they both lack the stellate trichomes of the Texas poppy-mallow. Also, low poppy-mallow tends to be prostrate, rather than erect, and has toothed leaf segment margins (Poole and Riskind 1987, Texas Parks and Wildlife Department 1996b).

Habitat: The Texas poppy-mallow occurs within the grasslands or open oak or mesquite woodlands of the Rolling Plains Vegetational Area of Texas described by Hatch et al. (1990). Its distribution is limited to former and current terraces of the upper Colorado River underlain by the deep, loose sands of the Tivoli soil series, created and deposited by water and wind erosion (Poole and Riskind 1987, Texas Organization for Endangered Species 1993). The sandy substrate inhabited by the Texas poppy-mallow is unusual for this region and supports a diversity of unique sand-adapted species, including numerous flowering plants. Common associated species include Havard oak (*Quercus havardii*), Texas bullnettle (*Cnidioscolus texanus*), Indian blanket, yellow woolly-white (*Hymenopappus flavescens*), eastern sensitive briar (*Schrankia occidentalis*), trailing wildbean (*Strophostyles helvola*), prairie spiderwort (*Tradescantia occidentalis*), giant dropseed (*Sporobolus giganteus*), sand dropseed (*Sporobolus cryptandrus*), and threeawn grasses (*Aristida* spp.) (Service 1985a, Texas Parks and Wildlife Department 1996b).

Range: Texas poppy-mallow has 10 known populations, all of which occur in Coke, Mitchell, and Runnels counties (Poole et al. 2004, Service 2010, Texas Parks and Wildlife Department 1996b). Runnels County is home to the largest historical population, located several miles southwest of Ballinger, which is believed to have once covered about 395 acres (160 hectares) of deep sands. Today, disturbance and encroachment have eliminated much of the historical population leaving small, segregated remnants in the area (Service 1985a). The sites in Coke and Mitchell counties were recorded more recently, after 1985. As of 1987, all known locations occurred on private land and on Texas Department of Transportation (TxDOT) and public transportation rights-of-way (Poole and Riskind 1987).

Distribution in the Proposed Permit Area: All known populations of the Texas poppy-mallow occur within the proposed Permit Area (Figure 3-2).

Reason for Decline: Since the distribution of the Texas poppy-mallow is endemic to a single soil series, this species is extremely vulnerable to extinction due to habitat loss. In the past, habitat destruction has been caused by crop and pasture planting, residential development, road and railway construction, and sand mining. The showy bloom of the Texas poppy-mallow also exposes this plant to the risk of collection by gardeners and rare plant enthusiasts (46 *Federal Register* 3184–3186, Texas Parks and Wildlife Department 1996b).



— The Applicant's Proposed Permit Area

▨ Known County Records

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Figure 3-2
TEXAS POPPY-MALLOW
(Callirhoe scabriuscula)

Source: Poole et al. (2004); Service (2010)

3.2.1.3 Navasota Ladies'-Tresses (*Spiranthes parksii*)

Status: Endangered (47 *Federal Register* 19539, 6 May 1982) without critical habitat.

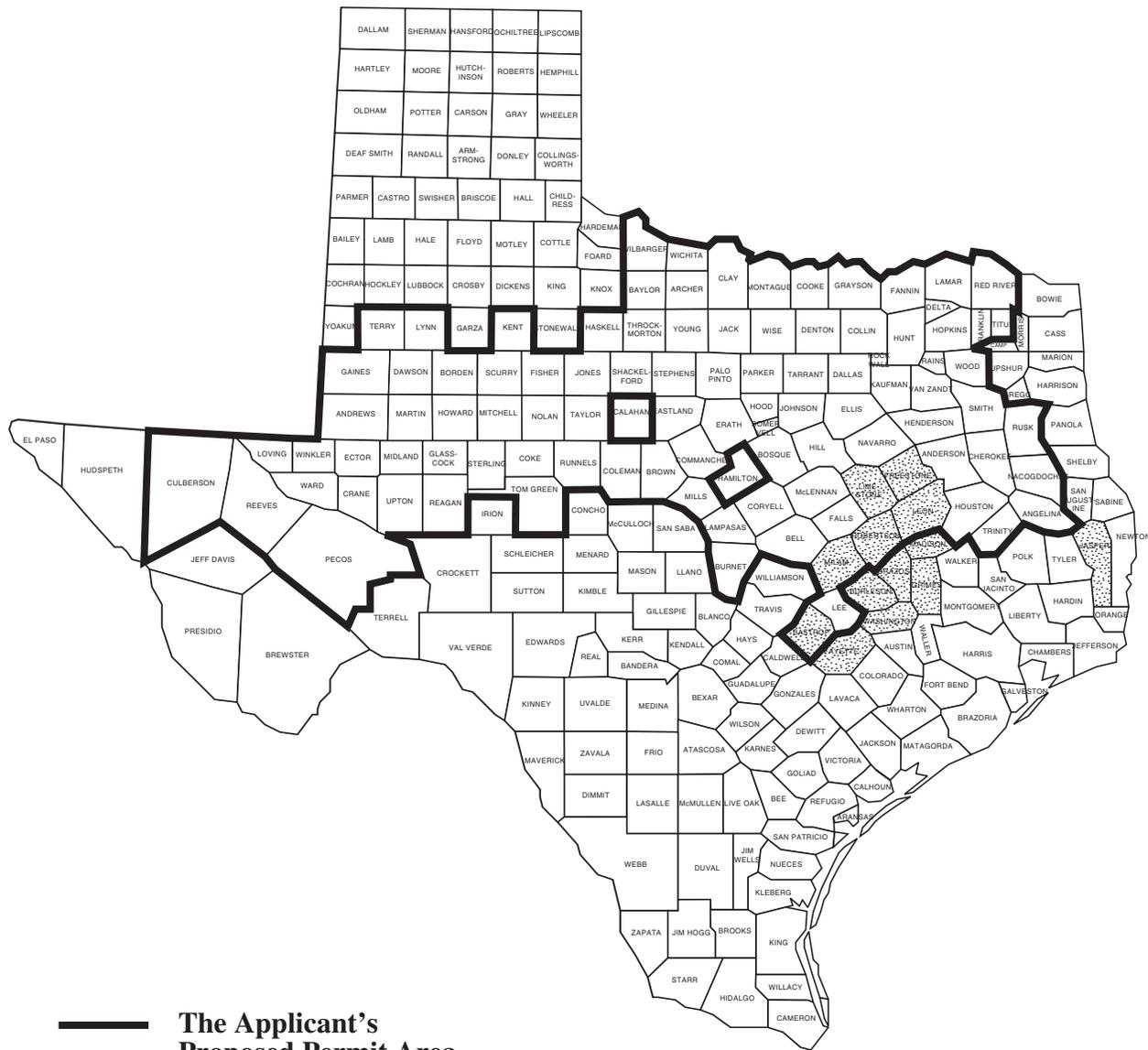
Description: A diminutive member of the orchid family (Orchidaceae), the Navasota ladies'-tresses reaches a mere 8 to 15 inches (20 to 38 centimeters) tall and has a single row of small blooms (0.25 inch or 0.6 centimeter) wound loosely around the top third of the slender inflorescence. Each cream-colored flower has two long, hairy, lateral sepals that are hooked upward at the tips. The lateral petals are shorter than the sepals and appear to be hidden. The lower bract of each flower is broadly lanceolate to triangular and hairy, tapering to a pointed tip. These perennial orchids flower in mid-October to mid-November, and fruits form until the first frost, usually in late November. Each fruit contains thousands of tiny seeds. Its linear basal leaves are usually absent by bloom time, but the inflorescent stalk has several leaflike sheathes (Poole and Riskind 1987, Service 1984a, 1995a, Wilson n.d.).

Navasota ladies'-tresses can be discerned from its close relatives, nodding ladies'-tresses (*Spiranthes cernua*) and slender ladies'-tresses (*Spiranthes lacera* var. *gracilis*) that also bloom during the same fall period, by specific floral characteristics. The nodding ladies'-tresses has a tighter spiral, relatively longer flowers (up to 0.5 inch or 1.3 centimeters), straight, white lateral petals, and lacks the white tips on its bracts. The slender ladies'-tresses has green inside the lower petal and drooping, solid white lateral petals (Poole and Riskind 1987).

Habitat: The Navasota ladies'-tresses is found in Post Oak Savannah interspersed between the Pineywoods and Blackland Prairies vegetational areas described by Hatch et al. (1990). It generally occupies upland areas (about 250 feet [76 meters] above mean sea level) between the upper margins and adjacent lands of minor, intermittent tributaries of the Brazos and Navasota rivers and the uppermost reaches of their floodplains. The soils of its habitat are often well-drained sandy, loamy soils with an underlying claypan, allowing sufficient subsurface hydrology. This species tolerates minimal natural disturbances that maintain canopy breaks in its open habitat. Commonly associated vegetation in Navasota ladies'-tresses habitat includes post oak, blackjack oak, yaupon, American beautyberry, and little bluestem (Poole and Riskind 1987, Texas Parks and Wildlife Department 1997).

Range: Since its listing in 1982, discoveries of Navasota ladies'-tresses populations have expanded from just two sites in Brazos County to about 100 sites with over 3,141 individual plants in 13 counties. Populations are known from Bastrop, Brazos, Burleson, Fayette, Freestone, Grimes, Jasper, Leon, Limestone, Madison, Milam, Robertson, and Washington counties (Poole et al. 2004, Service 2010, Turner et al. 2003, D. Scott, Natural Diversity Database, pers. comm. to D. Green, PBS&J 2006).

Distribution in the Proposed Permit Area: Navasota ladies'-tresses occurs in six counties within the proposed Permit Area: Bastrop, Freestone, Leon, Limestone, Milam, and Robertson (Figure 3-3).



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▨ Known County Records

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Figure 3-3
NAVASOTA LADIES'-TRESSES
(Spiranthes parksii)

Source: Turner et al. (2003); Poole et al. (2004); Service (2010)

Reason for Decline: The most significant threat to this species' survival is habitat destruction due primarily to strip mining; residential, commercial, and roadway construction; and oil and gas development. Other causes for concern include this species' limited range and low numbers as well as possible browsing by deer (NatureServe 2009, Service 1984a, 1995a, Texas Parks and Wildlife Department 1997). Collection may be another threat to this orchid, although such an impact would be relatively minor compared with other causes of decline (Wilson n.d.).

3.2.1.4 Pecos Sunflower (*Helianthus paradoxus*)

Status: Threatened (64 *Federal Register* 56590, 20 October 1999) with critical habitat (73 *Federal Register* 17761, 1 April 2008).

Description: The Pecos sunflower is a halophytic, annual composite, similar in appearance to the common sunflower (*Helianthus annuus*). Its flowers are yellow with centers composed of dark purple disk flowers. Its three-veined lanceolate leaves are arranged opposite on the lower part of the stem and become alternate toward the top. It grows to approximately 4 to 7 feet (1 to 2 meters) and blooms from September through November. Aside from subtle physical differences, the most apparent characteristics distinguishing the Pecos sunflower from the common sunflower are its strictly autumn bloom time (as opposed to spring through fall blooming in the common sunflower) and its restricted habitat (Poole and Riskind 1987, 64 *Federal Register* 56582–56590, 20 October 1999).

Habitat: The Pecos sunflower is dependent on deep, saturated, loamy soils found in spring-fed desert wetlands, called cienegas, in addition to stream, lake and pond margins. Lake and pond habitat for the species is generally created from impounded natural springs. This species is highly tolerant of the saline conditions typical of these habitats. Other species commonly associated with the Pecos sunflower are sea-lavender (*Limonium limbatum*), limewater brookweed (*Samolus ebracteatus* var. *cuneatus*), clasping flaveria (*Flaveria chlorifolia*), Olney bulrush (*Scirpus americanus*), common reed (*Phragmites australis*), saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), scratchgrass (*Muhlenbergia asperifolia*), Mexican rush (*Juncus mexicanus*), seepweed (*Suaeda calceoliformis*), and saltcedar (*Tamarix* spp.). The Pecos sunflower occupies a specific niche in this community, growing most frequently alongside sea-lavender, limewater brookweed, clasping flaveria, and saltgrass in a zone of intermediate saturation (Poole and Diamond 1992).

Since cienegas are rare ecosystems, they often support numerous sensitive species. Desert wetlands in the Diamond Y Springs Nature Preserve in Pecos County support a large population of Pecos sunflower as well as the endangered Leon Springs pupfish (*Cyprinodon bovinus*) and Pecos gambusia (*Gambusia nobilis*), and three rare aquatic snails (Seiler et al. 1981, The Nature Conservancy of Texas n.d.). Desert wetlands in East Sandia Springs Nature Preserve also support two endangered fish, the Comanche Springs pupfish (*Cyprinodon elegans*) and Pecos gambusia, rare snails, and the Pecos sunflower (The Nature Conservancy of Texas n.d.). Cienegas in New Mexico's Bitter Lake National Wildlife Refuge support

four aquatic invertebrates recently proposed for listing by the Service (67 *Federal Register* 3805–38060, 31 May 2002) and three sensitive plant species in addition to the Pecos sunflower (NatureServe 2009).

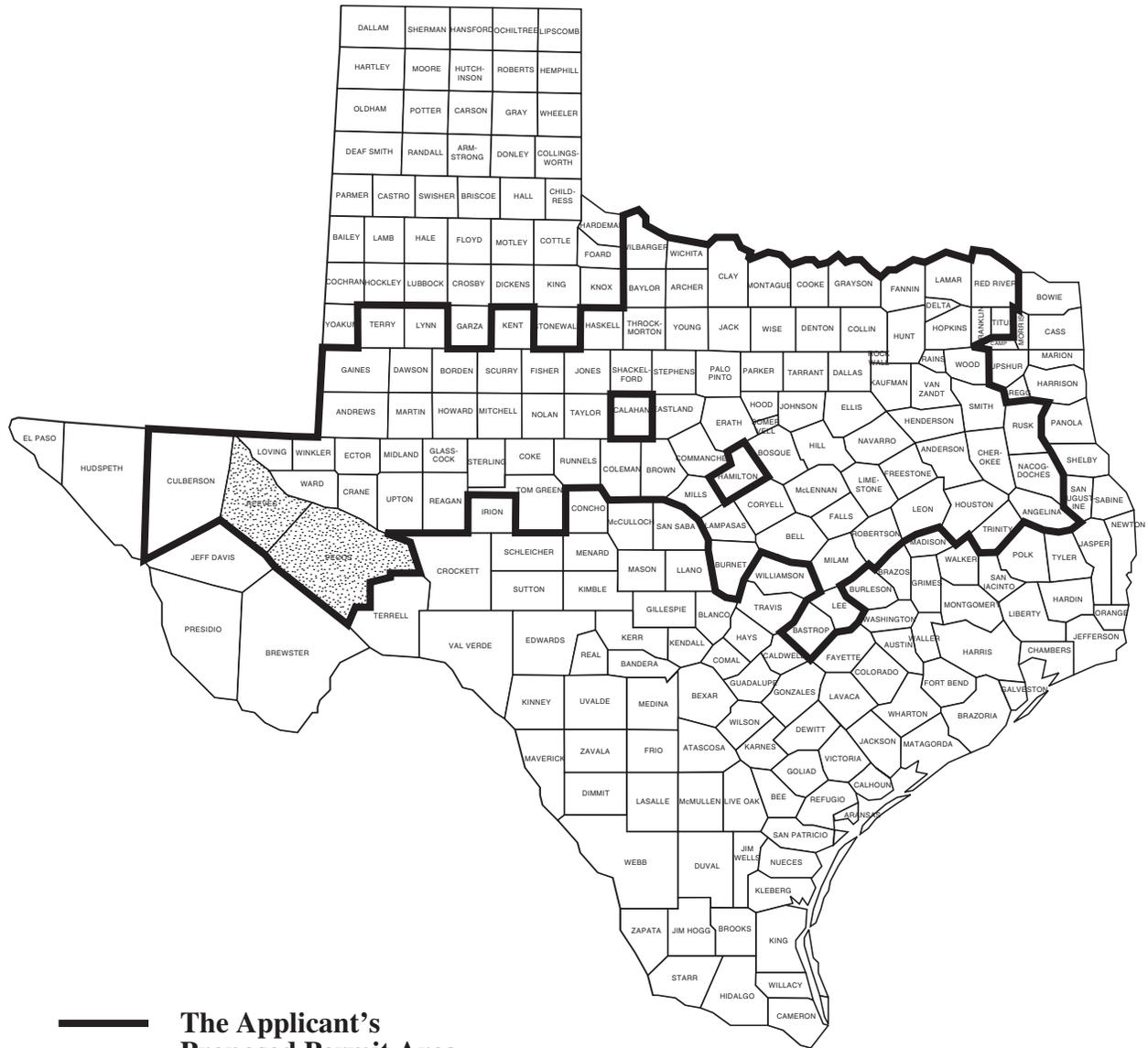
Critical Habitat: In 2008, the Service designated a total of 1,305 acres (528 hectares) of land as critical habitat for the Pecos sunflower. The critical habitat for the Pecos sunflower is divided into 5 units: Units 1-4 occur in New Mexico and Unit 5 is in Texas. Unit 5 encompasses 240 acres (97 hectares) and is located approximately 12 miles (20 kilometers) north-northwest of Fort Stockton, Texas. This unit is located mostly within the 3,962-acre (1,603-hectare) Diamond Y Spring Preserve in Pecos County, which is owned and operated by the Nature Conservancy of Texas. However, a portion of the critical habitat in Unit 5 is located on a parcel of private land adjacent to the Diamond Y Spring Preserve. At the time of designation, Unit 5 was occupied and contained all of the primary constituent elements (PCEs) defined as essential to conserve the Pecos sunflower. Unit 5 is estimated to contain several hundred thousand to one million Pecos sunflower plants (73 *Federal Register* 17761, 1 April 2008).

Range: The Pecos sunflower is currently known from Pecos and Reeves counties in Texas and from New Mexico within the Pecos River system (64 *Federal Register* 56582–56590, 20 October 1999, Poole et al. 2004, Service 2004a). The type locality is near Fort Stockton in Pecos County and consists of a large population of several hundred thousand plants at Diamond Y Spring, with a smaller group of plants on a nearby highway rights-of-way. A second Texas population is located at Sandia Spring in the Balmorhea area of Reeves County. Both of the Texas populations occur on land owned and managed by The Nature Conservancy of Texas. The Diamond Y Preserve and the East Sandia Springs Preserve are currently actively managed to remove saltcedar and common sunflower. The Diamond Y Preserve also restricts grazing from August through November and has formed an agreement with the TxDOT to avoid mowing and the use of herbicides within the TxDOT rights-of-way along Diamond Y Creek to protect this species (NatureServe 2009, Service 2004a).

Distribution in the Proposed Permit Area: All Texas sites occur in counties within the proposed Permit Area (Figure 3-4).

Reasons for Decline: Loss of spring flow appears to be the greatest threat to Pecos sunflower populations in Texas. As groundwater is withdrawn for irrigation, municipal and other purposes, consumed by saltcedar, or desiccated during periods of drought, the water table is lowered and springs become dry, sometimes permanently. Other notable causes of decline include alteration of wetlands; competition and displacement by nonnative species, particularly saltcedar; mowing; overgrazing by livestock; and collection (Poole and Diamond 1992, 64 *Federal Register* 56582–56590, 20 October 1999).

Research has indicated that this species can benefit from active land management. Removal of saltcedar and the Russian olive (*Elaeagnus angustifolia*), which compete with both the Pecos sunflower and common sunflower, has proved beneficial (NatureServe 2009). The two sunflower species can hybridize.



The Applicant's Proposed Permit Area

Known County Records

- Engineering
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Figure 3-4
PECOS SUNFLOWER
(Helianthus paradoxus)

Source: Poole et al. (2004); Service (2010)
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Studies on the effects of livestock have shown that grazing can remove competitors, allowing for more vigorous growth, although uncontrolled grazing can reduce reproductive success and biomass (Bush and Van Auken 1997).

3.2.2 Invertebrates

3.2.2.1 American Burying Beetle (*Nicrophorus americanus*)

Status: Endangered (54 *Federal Register* 29652, 13 July 1989). Critical habitat has not been designated. The Final Recovery Plan was signed on 27 September 1991.

Description: The American burying beetle is the largest member of the genus *Nicrophorus* in North America. It ranges from 1 to 1.5 inches (2.5 to 4.5 centimeters) in length, and has a shiny black appearance. Like most other burying beetles, the American burying beetle has four red-orange spots on the wing covers. It can be distinguished from other North American burying beetles by its larger size and its orange-red pronotum and frons. This beetle, which feeds largely on carrion, was formerly known as the giant carrion beetle. It is largely nocturnal and lives for only 1 year (Service 2005a).

Habitat: While the American burying beetle is thought to be a habitat generalist, its habitat requirements, particularly for reproduction, are not fully understood at present. It has been encountered in various types of habitat including oak-pine woodland, oak-hickory forest, pine forest, bottomland/riparian woodland, open grassland, open agricultural land, and edge habitat. Habitat requirements would include soils suitable for the burial of carcasses; xeric, saturated, or loose sandy soils are not suitable (Service 1991a, 2005a). Although feeding mainly on a wide variety of carrion, this species may also capture and consume live insects (Scott and Traniello 1989).

Range: The historical distribution of the American burying beetle includes the eastern half of North America from southern Ontario, Canada and the northern peninsula of Michigan to the southern Atlantic coastal plain, including the eastern half of Oklahoma and east Texas. At the time of listing in 1989, only three areas of occurrence were known. Two of these were in Oklahoma and the other was in Rhode Island. The current distribution covers eight states: Rhode Island (Block Island), Massachusetts (Nantucket Island and Penikese Island), South Dakota, Nebraska, Kansas, Arkansas, Oklahoma, and Texas. The westernmost known occurrence is a 1988 record from Dawes County, Nebraska. This species has disappeared from over 90 percent of its historic range and has been in decline for over a century (Service 1991a, 2005a).

In Oklahoma, the beetle is known to occur in 22 counties, with two additional Oklahoma counties having unconfirmed sightings. Unconfirmed sightings are defined as likely sightings, although they have not been confirmed by an entomologist or by a Service biologist. In addition, nine counties are considered likely to support this species due to the presence of suitable habitat and to their proximity to counties with current American burying beetle occurrences. No current surveys, however, have been conducted in these counties. Ohio has reintroduced American burying beetles over a 3-year period. To date, the status

of this reintroduced population is poor. Additional research is needed to properly understand the requirements of the American burying beetle and achieve successful reintroduction efforts (Service 2005a).

Distribution in the Proposed Permit Area: In Texas, this beetle is only found in two counties: Lamar and Red River, both of which occur within the proposed Permit Area (Figure 3-5). The occurrence in Red River County is a recent record (O. Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2004). The Lamar County population in Texas is on a military base, Camp Maxey (Texas National Guard), while the Red River County population is on a preserve, Lennox Woods, owned by The Nature Conservancy of Texas (NatureServe 2009, O. Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2006).

Reasons for Decline: While the cause for the decline of this species is not clearly understood, it could be a result of habitat fragmentation, habitat loss, carcass limitation (i.e., reduced availability of optimum-sized carrion), pesticides, disease, light pollution, interspecific competition for carcasses, or a combination of these factors. The primary cause, however, has been attributed to habitat loss and fragmentation (Service 1991a, 2005a).

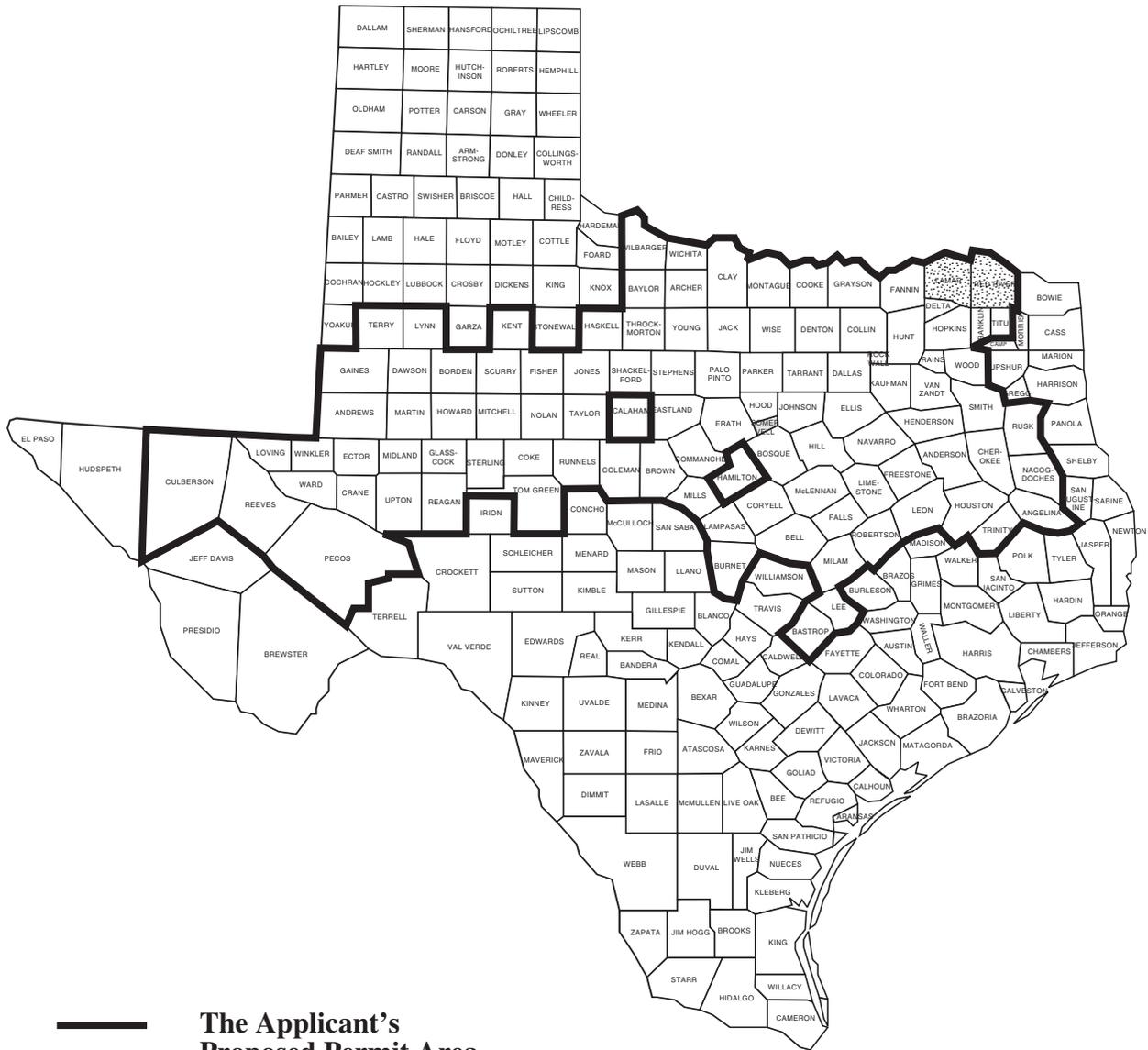
3.2.3 Amphibians

3.2.3.1 Houston Toad (*Bufo houstonensis*)

Status: Endangered (35 *Federal Register* 16047, 13 October 1970) with critical habitat (43 *Federal Register* 4022, 31 January 1978).

Description: Individual Houston toad coloration can vary considerably. While the toads are generally brown and speckled, they can appear light brown to almost black and can have a slightly reddish, yellowish or grayish hue. Two dark bands extend from each eye down to the mouth, and their legs are banded with darker pigment. A variable white stripe lines the sides of the toad's body. Their undersides are usually pale with small, dark spots. Males have a dark throat that appears bluish when distended. Adult Houston toads are 2 to 3.5 inches (5 to 9 centimeters) long and, like all toads, are covered with raised skin patches that contain chemicals that make the toad distasteful and sometimes poisonous to predators (Service 1984b).

Habitat: The Houston toad occurs on rolling uplands characterized by pine and/or oak woodlands (loblolly pine, post oak, blackjack oak, and bluejack oak [*Quercus incana*]) underlain by pockets of deep, sandy soils (Campbell 2003, Service 1995a). Because their skin is semipermeable to water, Houston toads become dormant to escape harsh weather conditions, such as winter cold (hibernation) and drought (aestivation). They seek protection during this time by burrowing into sand or hiding under rocks, leaf litter, logs, or in abandoned animal burrows (Service 1995a). Although Houston toads are typically associated with woodland habitat, they also breed in and migrate across sparsely wooded and cleared



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Figure 3-5
 AMERICAN BURYING BEETLE
 (*Nicrophorus americanus*)

Source: Service (1995a, 2005, 2010)

areas near woodlands. They may also breed in and traverse areas that do not support deep sands, including clay and gravel substrates, provided these areas are near woodlands underlain by pockets of deep, sandy soils (Hillis et al. 1984).

Houston toads breed from January to June with a peak in February and March. Male Houston toads have been observed traveling up to 0.3 mile (500 meters) between ponds and up to 0.9 mile (1,375 meters) within a 24-hour period (Price 1992). Although this species has been known to breed along the edges of flooded fields and permanent ponds (Service 1984b), it appears to prefer shallow ephemeral rain pools for breeding (Price 1990). In wet years, breeding may occur wherever sufficient standing water is present. For successful breeding, water must persist for at least 60 days to allow egg hatching, tadpole maturation, and emergence of toadlets (Hillis et al. 1984, Service 1984b). Algae and pollen found in permanent or ephemeral waterbodies comprise the primary food source for tadpoles (Hillis et al. 1984). Mortality of young is high due to predation and drying of breeding sites, with less than 1 percent of the eggs laid believed to survive to adulthood (Service 1984b, 1994a, 1995a). Adult toads are indiscriminate feeders and eat a wide variety of insects and other invertebrates (Service 1984b).

Critical Habitat: Designated by the Service on January 31, 1978, critical habitat for the Houston toad includes areas in Bastrop and Burleson counties that represented the last remaining habitat and breeding sites for the species and supported the largest known populations of the species at the time of designation. Of the approximately 100,000 acres (40,469 hectares) of designated critical habitat, Bastrop County contains the largest area, encompassing about 98,000 acres (39,659 hectares) or 98 percent of critical habitat. Houston toad occupancy of the approximately 2,000 acres (809 hectares) of critical habitat in Burleson County has not been recorded since 1983, and the status of extant populations is uncertain (Service 2003c).

Range: The Houston toad is endemic to Texas. It was first discovered in the Houston area and was formally recognized as a new species in 1953. By the 1970s, toad populations disappeared across three Houston-area counties, Harris, Fort Bend, and Liberty, due to urban expansion (Service 1984b). Since 1989, Houston toad populations have been documented in nine counties: Austin, Bastrop, Burleson, Colorado, Lavaca, Lee, Leon, Milam, and Robertson (Service 2010, Yantis 1989, 1990, 1991, Yantis and Price 1993). Several of these populations, however, have never been relocated. The Lost Pines area of Bastrop County continues to support the largest known population of Houston toads throughout their range (Forstner 2003). Bastrop State Park is the only public land that supports a large number of Houston toads; however, this population is not sufficient to ensure the long-term survival of the species. While habitat analysis suggests that the Houston toad may also exist in Caldwell and Washington counties, no populations have been confirmed. According to Dixon (2000), the Houston toad has been recorded in Washington County, although the Service (2010) and Texas Parks and Wildlife Department records (Birnbaum 2001) do not reflect this assertion. In their annual report to the Texas Parks and Wildlife Department and the Service, Forstner et al. (2008) consider the Houston toad likely to be extirpated in Lavaca County, unlikely to occur in Lee County, and at very low numbers in Austin, Colorado, and Leon counties. However, more recently, a current population in Lee County has been confirmed at very low

numbers, and current populations in Austin County have been found in increased numbers (Paige Najvar, the Service, pers. comm. to G. Newgord, PBS&J 2010).

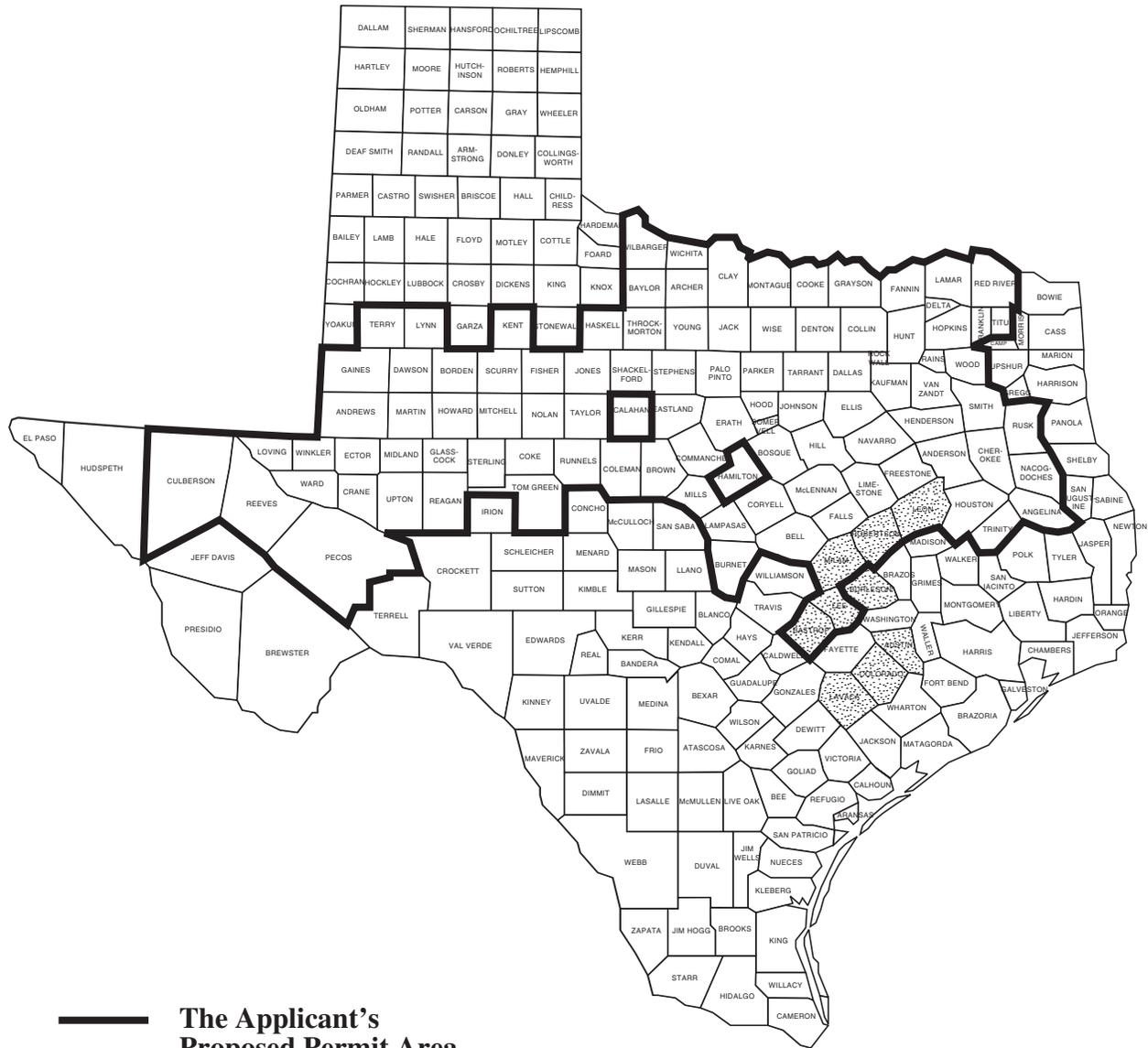
Distribution in the Proposed Permit Area: This species has been recorded from five counties within the proposed Permit Area, as shown on Figure 3-6. These are, from north to south, Leon, Robertson, Milam, Lee, and Bastrop counties.

Reasons for Decline: Population viability analyses indicate that Houston toads are vulnerable to extinction from impacts that reduce migration, adult survivorship, and reproductive success. Activities leading to the continued gradual and sustained reduction of available habitat have been identified as increasing the risk of population extinction. Population survival is enhanced by maintaining populations with subpopulations of relatively large and equal sizes with a migration rate among them of 2 percent per year or greater (Service 1994a).

Primary threats to the Houston toad include the destruction, conversion, and fragmentation of habitat throughout its range as a result of urbanization, logging, and agricultural production (Service 1995a). Each of these impacts can lead to the direct loss of woodland habitat and ephemeral breeding ponds, increasing the Houston toad's vulnerability to predators and competitors. Other inhospitable introductions to the landscape include roads, which increase the likelihood of motor vehicle strikes, and exotic turfgrasses, which limit mobility and dispersal and often involve the application of pesticides and herbicides (Knutson et al. 1999). Because it is often permanent, habitat conversion poses the most serious threat to the Houston toad. These factors work synergistically with the detrimental effects of habitat fragmentation, thus decreasing the numbers and distribution of toad populations (Denton et al. 1997, Knutson et al. 1999). Forstner (2003), however, noted that Houston toads were persisting within rural, acreage-lot subdivisions during 2002 monitoring surveys.

Some forestry practices, specifically clearcutting, result in the temporary destruction of woodland habitat, unless converted to another habitat type, in which case the destruction would be permanent. Depending on the extent and location of the clearing, however, an area that has been logged could eventually provide a habitat benefit to the toad as the woodland becomes reestablished, particularly if it is surrounded by other woodlands inhabited by the toad.

Agricultural production contributes to the loss of habitat through the conversion of woodlands to pasture or cropland, as well as through the alteration or destruction of watershed drainages and wetlands important for toad breeding and reproduction (Knutson et al. 1999). Conversion of habitat to other cover types may introduce competition by providing habitat for other species of toads, including Woodhouse's toad (*Anaxyrus woodhousii*) and the Gulf Coast toad. Conversion of habitat also encourages the establishment and proliferation of red imported fire ants (fire ants), which prefer open, sunny areas where soils have been disturbed from clearing of woody vegetation.



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Figure 3-6
HOUSTON TOAD
(Bufo houstonensis)

Source: Yantis and Price (1993); Service (1995a, 2010); Dixon (2000); Birnbaum (2001)

Increased fragmentation (smaller patches with greater distances between patches) isolates habitat and increases the Houston toad's vulnerability to adverse impacts, including predation, interspecific competition, and reduced food availability (Denton et al. 1997). Habitat fragmentation contributes to genetic isolation of populations or population fragments, thus leading to reduced genetic variation and viability. As both the number of populations and the number of individuals within populations decline, the species also becomes vulnerable to reduced reproduction and survival due to catastrophic events, such as severe and prolonged drought conditions. Droughts may reduce small populations to such low numbers that they are unable to recover.

Natural predators of adult Houston toads include birds, mammals, snakes, and turtles. In addition, fire ants tend to benefit from the presence of humans and are known to prey on toadlets, as well as on the invertebrate community that makes up the adult toad's food base. Where fire ant infestations occur, they undoubtedly impact the toad both directly and indirectly through predation and competition (Service 1984b, 1994a, 1995a, Texas Parks and Wildlife Department 1993).

3.2.4 Birds

3.2.4.1 Whooping Crane (*Grus americana*)

Status: Endangered (35 *Federal Register* 8491, 2 June 1970) with critical habitat (43 *Federal Register* 20938, 15 May 1978).

Description: The whooping crane is a large wading bird that in the last 50 years has returned from the brink of extinction. It is the tallest North American bird. Males, which are larger than females, may reach nearly 5 feet (1.5 meters). Adults are snowy white except for black primary feathers on the wings and a bare red face and crown. The bill is a dark olive-gray, which becomes lighter during the breeding season. The eyes are yellow and the legs and feet are gray-black. Immatures are a reddish cinnamon color that results in a mottled appearance as the white feather bases extend. The juvenile plumage is gradually replaced through the winter months and becomes predominantly white by the following spring as the dark red crown and face become apparent. Yearlings achieve the typical adult appearance by late in their second summer or fall. The life span in the wild is estimated to be 22 to 24 years (Campbell 2003, Canadian Wildlife Service [CWS] and the Service 2007, Lewis 1995).

Habitat: Nesting habitat in northern Canada is a poorly drained region of freshwater marshes and wet prairies interspersed with numerous potholes and narrow wooded ridges. Bulrush (*Scirpus validus*) is the dominant emergent in the potholes used for nesting, although cattail (*Typha* sp.), sedge (*Carex* sp.), and muskgrass (*Chara* sp.) also occur. White spruce (*Picea alauca*), black spruce (*Picea mariana*), tamarack (*Larix laricina*), and willows (*Salix* spp.) are common overstory species on the wooded ridges (Campbell 2003, CWS and the Service 2007, Lewis 1995).

Whooping cranes are known to utilize a variety of habitat types during migration, including freshwater marshes, wet prairies, inland lakes, small farm ponds, upland grain fields, and riverine systems. Shallow

flooded palustrine wetlands are used for roosting, while croplands and emergent wetlands are used for feeding. Riverine habitats, such as submerged sandbars, are often used for roosting. Most wetlands used for roosting are within 0.62 mile (1 kilometer) of a suitable feeding area (Armbruster 1990, Campbell 2003, CWS and the Service 2007, Howe 1987, 1989, Lewis 1995, Lingle et al. 1991).

The whooping crane's principal wintering habitat consists of approximately 22,500 acres (9,109 hectares) of brackish bays, marshes, and salt flats of the Aransas National Wildlife Refuge and adjacent publicly and privately owned wetlands in Texas. The coastal wintering grounds are dominated by salt grass (*Distichlis spicata*), saltwort (*Batis maritima*), smooth cordgrass (*Spartina alterniflora*), Gulf cordgrass (*Spartina spartinae*), glasswort (*Salicornia* sp.), and sea-ox-eye (*Borrchia frutescens*). Whooping cranes also forage on the interior upland portions of the refuge, which are characterized by oak mottes, grassland swales, and ponds on gently rolling sandy soils. Common species include live oak, redbay (*Persea borbonia*), and bluestem (*Andropogon* spp.) (Campbell 2003, CWS and the Service 2007, Lewis 1995).

Whooping cranes usually mate for life. They mature at 3 to 4 years of age, and most females are capable of producing eggs by the age of 4 years. Egg-laying occurs from late April through mid May, with most nests containing two eggs. Hatching takes about 1 month. Both parents share incubation and brood-rearing duties. Whooping cranes are omnivorous, and forage by probing and gleaning foods from soil, water, and vegetation. Summer foods include dragonflies, damselflies, other aquatic insects, crayfish, clams, snails, aquatic tuber, grasshoppers, crickets, frogs, mice, voles, small flightless birds, minnows, reptiles, and berries. During the winter in Texas they eat a wide variety of plant and animal foods. Blue crabs (*Callinectes sapidus*), clams, and berries of Carolina wolfberry (*Lycium carolinianum*) are predominant in the diet. Whooping cranes also forage for acorns, snails, crayfish, and insects in upland areas. Waste grains, such as barley and wheat, are an important part of the diet during the spring and fall migrations (Campbell 2003, CWS and the Service 2007, Lewis 1995).

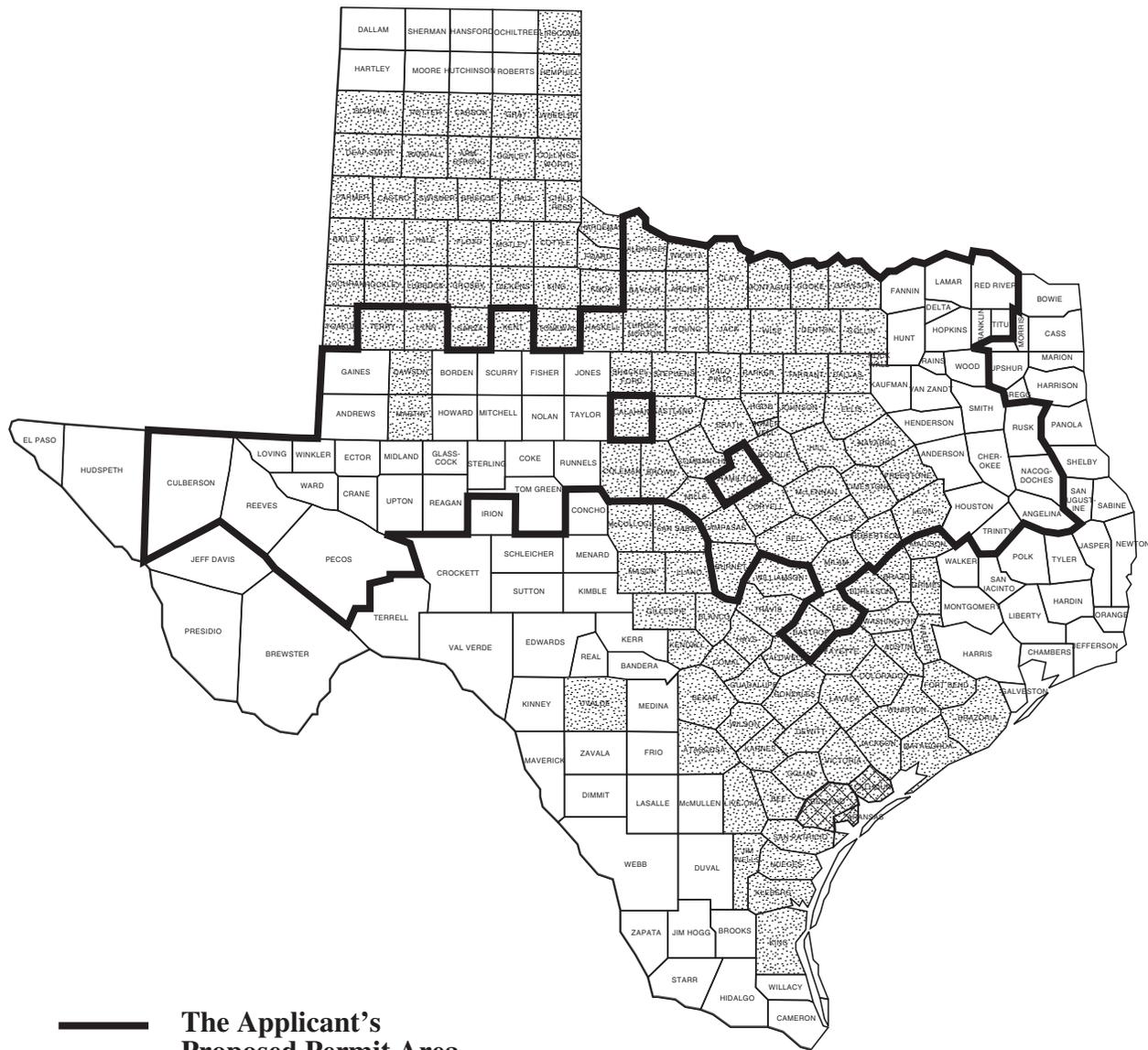
Critical Habitat: Critical habitat for the whooping crane was designated by the Service in May 1978 (43 *Federal Register* 20938, 15 May 1978) to include rearing and wintering areas, as well as roosting areas used as traditional stopover sites in migration. At that time, critical habitat was defined as nine regions in seven states: Colorado, Idaho, Kansas, Nebraska, New Mexico, Oklahoma, and Texas. Subsequent determination by the Service in July 1997 (62 *Federal Register* 38932) designated the Rocky Mountain whooping crane population as an experimental nonessential population and removed critical habitat designations from four national wildlife refuges. Based on this determination, critical habitat for the whooping crane constitutes five regions in four states (Kansas, Nebraska, Oklahoma, and Texas), which includes wintering range in the Aransas National Wildlife Refuge and vicinity on the Texas Gulf Coast.

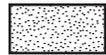
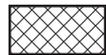
Range: Whooping cranes were originally found throughout most of North America. The historic range for the whooping crane once extended from the Arctic coast south to central Mexico, and from Utah east to New Jersey, into South Carolina, Georgia, and Florida. The historic breeding range once extended across north-central United States and in the Canadian provinces of Manitoba, Saskatchewan, and Alberta. In the nineteenth century, the main breeding area was from the Northwest Territories to the

prairie provinces in Canada, and the northern prairie states to Illinois. Only three wild populations of whooping cranes exist, the largest of which is the Aransas-Wood Buffalo population, which breeds in isolated marshy areas of Wood Buffalo National Park in Canada's Northwest Territories. Each fall, the entire population of whooping cranes from this national park in northern Canada migrates some 2,600 miles (4,183 kilometers) primarily to the Aransas National Wildlife Refuge and adjacent areas of the central Texas coast in Aransas, Calhoun, and Refugio counties, where it overwinters in oak savannahs, salt marshes, and bays. In Texas, the natural wild population of whooping cranes spends its winters at the Aransas National Wildlife Refuge, Matagorda Island, Isla San Jose, portions of the Lamar Peninsula, and Welder Point on the east side of San Antonio Bay. Fall migration occurs in the mid September–mid November time frame, while the spring migration occurs largely in April, with spring migration being the more rapid by 2 to 4 weeks (Campbell 2003, CWS and the Service 2007, Lewis 1995, Service 1995a, 2009b). As of September 30, 2010, the three populations of whooping cranes in the wild totaled 407 birds; 263 in the Aransas-Wood Buffalo flock, 25 in the nonmigratory population in central Florida, and 119 in the eastern population that migrates between Wisconsin and Florida (Whooping Crane Eastern Partnership 2010). In spring 2011, the Aransas-Wood Buffalo flock consisted of 279 birds: 235 adults, and 44 juveniles (Tom Stehn, Whooping Crane Coordinator, Aransas NWR pers. comm. to D. Green and J. Williamson, Atkins [formerly PBS&J], July 6, 2011).

Whooping cranes make frequent stops to feed and rest during migration. While they will utilize a variety of habitats for foraging and roosting during these stops, they seem to prefer isolated sites away from human activities. Whooping cranes have an unpredictable pattern of stopover habitat use and may not use the same stopover sites annually. Whooping cranes are diurnal migrants and often stop wherever they happen to be late in the day when they find conditions no longer suitable for migration. Thus, a few cranes could stop at a small farm pond or wetland for one night and rarely or never use the same location again. Some areas, however, are used on a regular basis and would be considered traditional stopover sites. Some of these sites have been designated as critical habitat. The normal migration corridor for the whooping crane stretches from the panhandle eastward to the east-central portion of the state (Service 1995a). Because of weather conditions, including strong winds that may blow the birds off course to the east or west, the whooping crane migration corridor may be more than 200 miles wide (Service 2009a).

Distribution in the Proposed Permit Area: The Service (2010) lists the whooping crane for 52 counties within the proposed Permit Area, as shown on Figure 3-7. Oberholser (1974) documented spring/fall migration records for eight counties within the proposed Permit Area: Cooke, Dallas, Fannin, Lampasas, McLennan, Navarro, Tom Green, and Young. Neither Fannin County nor Tom Green County is listed by the Service (2010). Pulich (1988) added Baylor, Clay, Ellis, Jack, Johnson, Parker, Tarrant, and Wilbarger counties, while Howe (1989), in a migration study of radio-marked whooping cranes, recorded whooping cranes at stopover areas in five Texas counties, adding Montague and Wichita counties. Austin and Richert (2001), in a comprehensive review of whooping crane sightings between 1943 and 1999, added seven more counties within the proposed Permit Area: Bell, Bosque, Comanche, Coryell, Denton, Lynn,



-  **The Applicant's Proposed Permit Area**
-  **Known County Records**
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Figure 3-7
WHOOING CRANE
(Grus americana)

Source: Service (2010)

and Milam. Confirmed whooping crane sightings to Fall 2010 from the Cooperative Whooping Crane Sighting Project adds 12 counties in the proposed Permit Area: Archer, Bastrop, Burnet, Dawson, Grayson, Hill, Lee, Lynn, Martin, Palo Pinto, Terry, and Wise.

Reasons for Decline: The whooping crane population, estimated at 500 to 700 individuals in 1870, had declined to only 16 individuals (14 adults [including 3 or 4 females] and 2 young) in the migratory population by 1941. The main factors in the decline of the whooping crane were the conversion of the primary wetland nesting habitat to hay, pastureland, and grain production, human disturbance of nesting areas, shooting, specimen and egg collection, collisions with powerlines, fences and other structures, loss and degradation of migration stopover habitat, disease such as avian cholera, predation, lead poisoning, and loss of genetic diversity. Drought during the breeding season presents serious hazards to this species. Exposure to disease is a special problem when large numbers of birds are concentrated in limited areas, as often happens during times of drought. Biological factors, such as delayed sexual maturity (3 to 4 years) and small clutch size (two eggs, with only one chick typically fledging), prevent rapid population recovery. Whooping cranes are vulnerable to loss of habitat along their migration route, where they are still subject to cataclysmic weather events, accidental shooting, collision with power lines, and predation (Campbell 2003, CWS and the Service 2007, Lewis 1995, Service 2009a).

One of the greatest current threats to whooping cranes in the wild is the potential of a hurricane or a contaminant spill destroying their wintering habitat on the Texas coast, particularly along the Gulf Intracoastal Waterway, which passes through the center of their winter range. A spill from commercial vessels carrying toxic chemicals along this waterway could contaminate the cranes' food supply, or poison the cranes themselves. Loss and degradation of migration stopover habitat also continues to be a threat, as well as the limited genetic diversity of the population, which has lost an estimated 66 percent of the original genetic material. Another current threat is the increase in the number of wind farms. Wind energy is currently the fastest growing form of energy development in the United States. The increased potential of mortality of whooping cranes through collisions with the wind turbines and associated transmission lines during migration is of concern to the Service. Finally, the threat of global climate change may adversely affect the water regime, thereby adversely affecting the whooping crane population at both their nesting areas and their wintering grounds (Campbell 2003, CWS and the Service 2007, Service 2009a).

3.2.4.2 Golden-Cheeked Warbler (*Dendroica chrysoparia*)

Status: Endangered (55 *Federal Register* 18844, 4 May 1990, emergency rule; 55 *Federal Register* 53153–53160, 27 December 1990, final rule) without critical habitat.

Description: The golden-cheeked warbler is a small (about 5 inches [13 centimeters] in length) insectivorous bird. Adult males have black on the crown, nape, back, throat, and upper breast. The wings are black with two white wing bars. The cheeks are a bright golden-yellow with a black eye line. The

underparts are white, streaked with black on the flanks. Adult females are similar but duller; the crown and back are olive-green, with some black streaking (Farrand 1983, Oberholser 1974).

Habitat: From March to mid-summer, the golden-cheeked warbler inhabits juniper-oak woodlands in the Edwards Plateau, Lampasas Cut-Plain, and Llano Uplift regions of Texas. Ashe juniper and various oaks are the dominant tree species required in this migratory songbird's breeding habitat. The bark of mature Ashe junipers is essential for nest building, while deciduous trees, particularly oaks, are important for foraging. Texas red oak, plateau live oak, shin oak, cedar elm, walnut (*Juglans* spp.), hackberry, and Texas ash are common hardwoods where golden-cheeked warblers are found, particularly in the central part of its range. This habitat type is typically found in areas of steep slopes, canyon heads, draws, and adjacent ridgetops. Prime habitat occurs in patches of at least 250 acres, although smaller habitat patches are also used. Minimum patch size for successful reproduction ranges from 37 to 57 acres (15 to 23 hectares) (Arnold et al. 1996, Butcher 2008, Ladd 1985, Ladd and Gass 1999, Pulich 1976, Service 1992b, Wahl et al. 1990).

The golden-cheeked warbler migrates between its wintering grounds in southern Mexico and Central America and its breeding grounds in central Texas. The species arrives in early to mid-March and begins migrating south in June or July. Nesting is typically completed by the end of July, and most golden-cheeked warblers have left central Texas by early to mid-August (Ladd and Gass 1999, Wahl et al. 1990). For the purpose of this HCP, the breeding season for the golden-cheeked warbler is defined as March 1 through August 31.

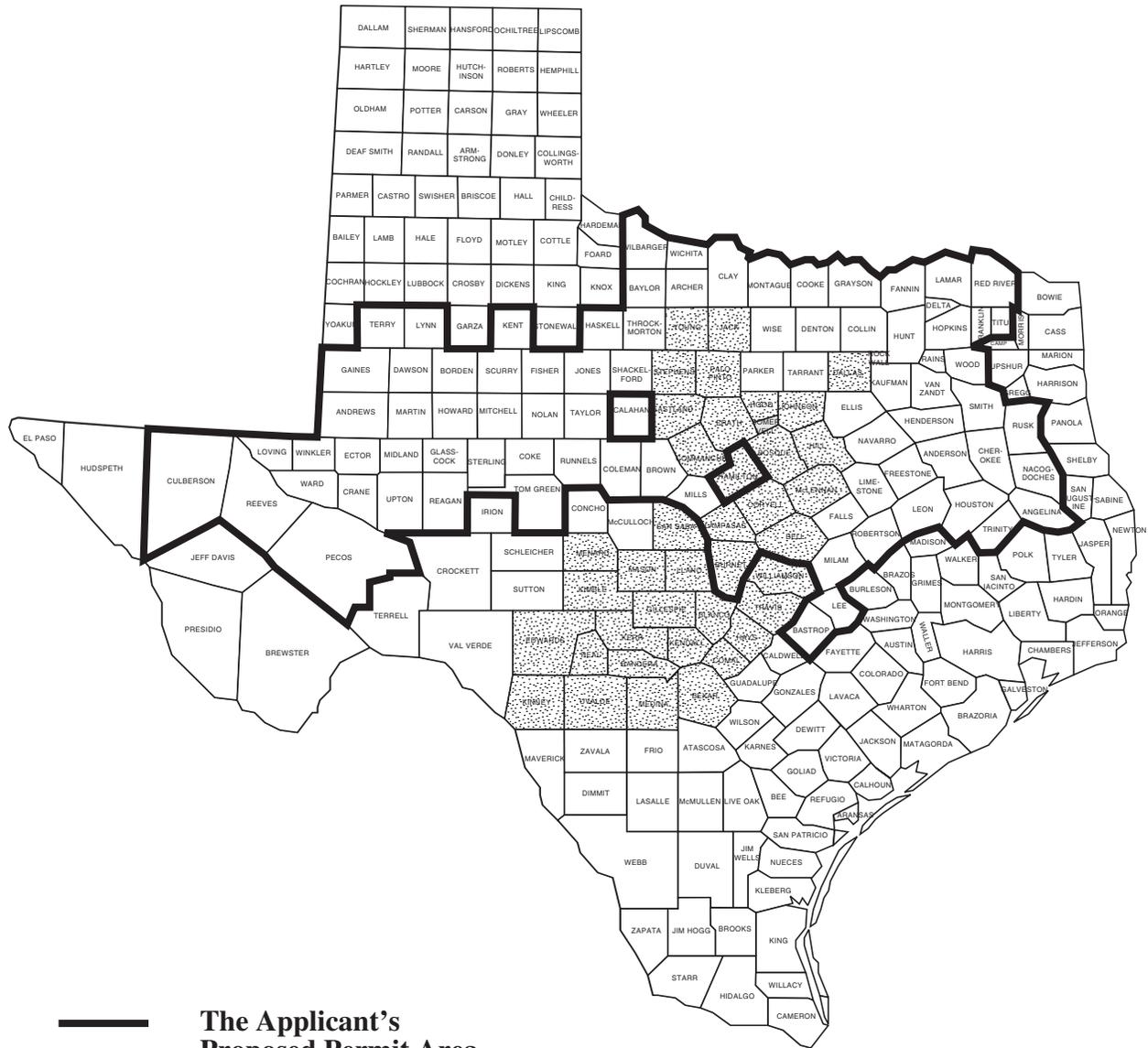
The territory size of a breeding pair of golden-cheeked warblers ranges from as little as 4 acres (1.6 hectares) to as much as 43 acres (17.4 hectares), with most falling in the range of 5 to 20 acres (2 to 8 hectares). The size is influenced by the habitat quality: usually, the poorer the quality, the larger the territory. Territories are defended by the males. Nests, composed of shreds of mature Ashe juniper bark bound with spider webs, are typically well camouflaged and located high in the nest tree, thereby making them difficult to find. The female is thought to select the nesting site and build the nest. One clutch of three to four eggs is generally produced in April of each year. Additional nesting attempts are rare and occur only if the first clutch is lost to predation or parasitism. Incubation is typically 10 to 12 days. The young fledge after 9 to 12 days and are fed by both parents for another month after leaving the nest. The golden-cheeked warbler feeds on insects, spiders, and other arthropods (Campbell 2003, City of Austin 2007, Holimon and Craft 2000, Jette et al. 1998, Ladd and Gass 1999, Peak 2007, Pulich 1976, Service 1992b, Travis County 2007, Wahl et al. 1990).

Range: Of all the bird species known to occur in Texas, only the golden-cheeked warbler nests exclusively within the state's boundaries (Ladd and Gass 1999). The golden-cheeked warbler historically nested in 41 of Texas' 254 counties (Pulich 1976, Service 1996). Current confirmed breeding records exist from 28 Texas counties: Bandera, Bell, Bexar, Blanco, Bosque, Burnet, Comal, Coryell, Dallas, Edwards, Erath, Gillespie, Hays, Jack, Johnson, Kendall, Kerr, Kimble, Lampasas, Llano, Medina, Palo Pinto, Real, San Saba, Somervell, Travis, Uvalde, and Williamson (Ladd and Gass 1999, Lasley et al.

1997, Lockwood and Freeman 2004, Service 1996, Omar Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2010). The golden-cheeked warbler was recently discovered in southeast Young County (Lasley et al. 1997) and was rediscovered in Dallas County in 2001 after a 35-year absence (Lockwood and Freeman 2004). The Dallas County sighting was of a lone individual on April 7, 2001 and represents the first county record since 1964 (North-Central Texas Birds 2009). Dallas County also had a sighting within the last 5 years in Dogwood Canyon, owned mostly by Audubon (Christina Williams, the Service, pers. comm., to G. Newgord, PBS&J 2010). However, the golden-cheeked warbler is not currently considered to breed in Young County. This species has also been encountered recently in Edwards County (Service 2008a) and Erath County (Whitenton Group 2004a). Both of these counties had prior historical records. Historical records also exist for Eastland, Hamilton, Hill, Hood, Kinney, McLennan, and Stephens counties (Oberholser 1974, Pulich 1976, 1988); however, suitable habitat within these counties was probably never extensive and has likely become more restricted because of recent habitat loss. Further studies are needed to determine the breeding status within these counties (Service 1996). Additional studies are also needed to determine the breeding status within Comanche, Ellis, Mason, Menard, and Mills counties. It is likely that small areas of potential habitat exist within these five counties; however, no recent or historical records exist from these counties (Ladd and Gass 1999). Figure 3-8 shows the known county records in Texas for this species. Additional records exist from Aransas, Bastrop, Brewster, Cameron, Galveston, Fayette, Hidalgo, and Karnes counties; however, these records represent migrating birds and no breeding records exist from any of these counties (Lockwood and Freeman 2004, Oberholser 1974, Peterson and Zimmer 1998). During the winter, the species occurs in woodlands of mountainous areas of southern Mexico (Braun et al. 1986) and east-central Guatemala through Honduras, Nicaragua, and possibly Belize (Pulich 1976, Service 1990a).

SWCA is currently reviewing the status of the golden-cheeked warbler and the Service is currently in the process of undertaking a 5-year status review of the species. According to SWCA's preliminary population estimates, approximately 20,000 to 25,000 breeding pairs of golden-cheeked warblers may occur (Service 2008a). More recently, however, Morrison et al. (2010) estimated between 175,000 and 265,000 (mean = 220,000) adult singing male golden-cheeked warblers in Texas during the 2009 breeding season.

Distribution in the Proposed Permit Area: The golden-cheeked warbler currently breeds in the following 11 counties within the proposed Permit Area: Bell, Bosque, Burnet, Coryell, Dallas, Erath, Jack, Johnson, Lampasas, Palo Pinto, and Somervell (Ladd and Gass 1999, Lasley et al. 1997, Lockwood and Freeman 2004, Service 1996, Whitenton Group 2004a). Breeding golden-cheeked warblers were recently encountered in Erath County (Whitenton Group 2004a). Four counties with reliable historical records also occur within the proposed Permit Area: Stephens, Eastland, Hood, and McLennan (Oberholser 1974, Pulich 1976, 1988). Mills and Ellis are two counties within the proposed Permit Area with no recent or historical records, but possibly containing small areas of potential habitat (Ladd and Gass 1999). Figure 3-8 shows the known county records for this species in the proposed Permit Area.



 **The Applicant's Proposed Permit Area**
 **Known County Records**



- Engineering
- Environmental Consulting
- Surveying

Figure 3-8
GOLDEN-CHEEKED WARBLER
(Dendroica chrysoparia)

Source: Oberholser (1974); Pulich (1976, 1988); Service (1995a, 1996, 2010); Lasley et al. (1997); Ladd and Gass (1999); Lockwood and Freeman (2004); Whintont Group (2004a)

Reasons for Decline: Most recent researchers have indicated that the population decline of the golden-cheeked warbler is a result of various factors related to destruction and fragmentation of quality habitat in the species' breeding and wintering ranges (Ladd and Gass 1999, Service 1992b, 1995a, Wahl et al. 1990). Among the major causes for the decline in the amount of contiguous, suitable habitat are land clearing for agricultural use, land development (urban encroachment), and highway and reservoir construction (Oberholser 1974). Reduction in habitat quality can be traced to the suppression of natural fires in the Hill Country and overgrazing, which result in a reduction of hardwoods present in juniper-oak communities (Campbell 2003).

Habitat loss and fragmentation have also indirectly contributed to reduced survival in the species by increasing edge habitat, resulting in greater vulnerability to nest parasitism and predation. The brown-headed cowbirds, an edge species, will lay its eggs in golden-cheeked warbler nests, often after removing golden-cheeked warbler eggs from the nest. Golden-cheeked warblers will then either abandon the nest, sometimes to renest elsewhere, or will continue to brood and fledge cowbird young, thus reducing survival of their own offspring (Campbell 2003). Ratsnakes (*Pantherophis* spp.), feral cats and dogs, opossums, raccoons, and other bird species are common predators of golden-cheeked warbler eggs. Other factors include loss of deciduous oaks, used for foraging, to oak wilt, and predation and competition by the blue jay and other urban avian species (Service 1992b).

3.2.4.3 Black-Capped Vireo (*Vireo atricapilla*)

Status: Endangered (52 *Federal Register* 37420–37423, 6 October 1987) without critical habitat. The Service completed a status review of this species on 19 June 2007 and recommended that the black-capped vireo be downlisted from endangered to threatened status (Service 2007).

Description: The black-capped vireo is a small (about 4.5 inches or 11.4 centimeters from head to tail) insectivorous bird. Characteristic features of the male include a black crown, nape and face, and white “spectacles” formed by white eye-rings with a white band connecting the eye-rings. The back of the bird is olive green; the wings and tail are blackish with yellow-green edges; the breast and belly are white with greenish yellow flanks; and the wings have two pale-yellow wing bars. Females of the species are similar, but duller, and have a slate gray cap (Farrand 1983, Oberholser 1974).

Habitat: The black-capped vireo occupies heterogeneous shrubland habitat that is characterized by a patchy distribution of shrub clumps and thickets, with at least 35 percent woody cover allowing light to reach ground level. The shrub stratum in this species' habitat is usually 4 to 10 feet (1 to 3 meters) high, with abundant deciduous foliage to ground level. Vegetation structure at this level is necessary because black-capped vireos place their nests at an average height of only 3 feet (0.9 meter) from the ground. Typical plant species in black-capped vireo breeding habitat include plateau live oak, shin oak, blackjack oak, Texas red oak, and various sumacs (*Rhus* spp.). Less-common species include Texas mountain laurel, Texas persimmon (*Diospyros texana*), and agarito. Black-capped vireos appear to exhibit a preference for deciduous species as nesting trees, although Ashe juniper may be codominant with the oaks

in this habitat. The minimum size for a patch of suitable habitat is 10 to 12 acres (4 to 5 hectares) (Graber 1957, 1961, Grzybowski 1995, Service 1991b).

The low-shrub habitat favored by this vireo is characteristic of mid-successional growth. Abundant growth in the lower to mid-stories is maintained by frequent disturbance, such as periodic fire and logging, where the native, woody, deciduous species are allowed to naturally regenerate. Some areas of black-capped vireo habitat are actively managed using bulldozing or hand-cutting to maintain appropriate species composition and form. Low-shrub habitat is also characteristic of areas where edaphic conditions, often thin soil layers over bedrock, inhibit growth of upperstory vegetation as in the Edward's Plateau region (Grzybowski 1995). Black-capped vireos may inhabit the same area as golden-cheeked warblers, with the black-capped vireos using the deciduous shrub foliage at the edge of the golden-cheeked warbler habitat (Grzybowski et al. 1994).

The black-capped vireo is migratory and present in Texas during the breeding season, arriving at the breeding grounds from late March to mid-April. The adult males arrive before the females and first-year males and leave after the females have already migrated south. Although the females are known to lay more than one clutch in a season so that parents may continue to rear young until mid-September, black-capped vireos start to leave the breeding grounds in August, continuing through September and early October (Grzybowski 1995). For the purpose of this HCP, however, the breeding season for the black-capped vireo is defined as March 15 through August 31.

Territory size is generally between 2.5 and 25 acres (1 and 10 hectares), with most being between 2 and 4 acres (0.8 and 1.6 hectares). Males defend the territory through song and sometimes through aggressive behavior. The nest is generally 1 to 4 feet (0.3 to 1.2 meters) above the ground. Normally 3 to 4 eggs are laid per clutch, with up to six clutches in a season, egg-laying occurring from early April through late July. A new nest is built for each clutch. Incubation is typically 14 to 19 days. The young fledge after 9 to 12 days and are fed by one or both parents for another 30 to 45 days after leaving the nest. Nest building, brooding, and feeding the young are undertaken by both the male and the female. The black-capped vireo feeds on insects, spiders, larvae, and other food items from foliage, usually within the upper strata of the canopy (Graber 1957, Grzybowski 1995, Service 1991b, Tazik and Cornelius 1989, Wilkins et al 2006).

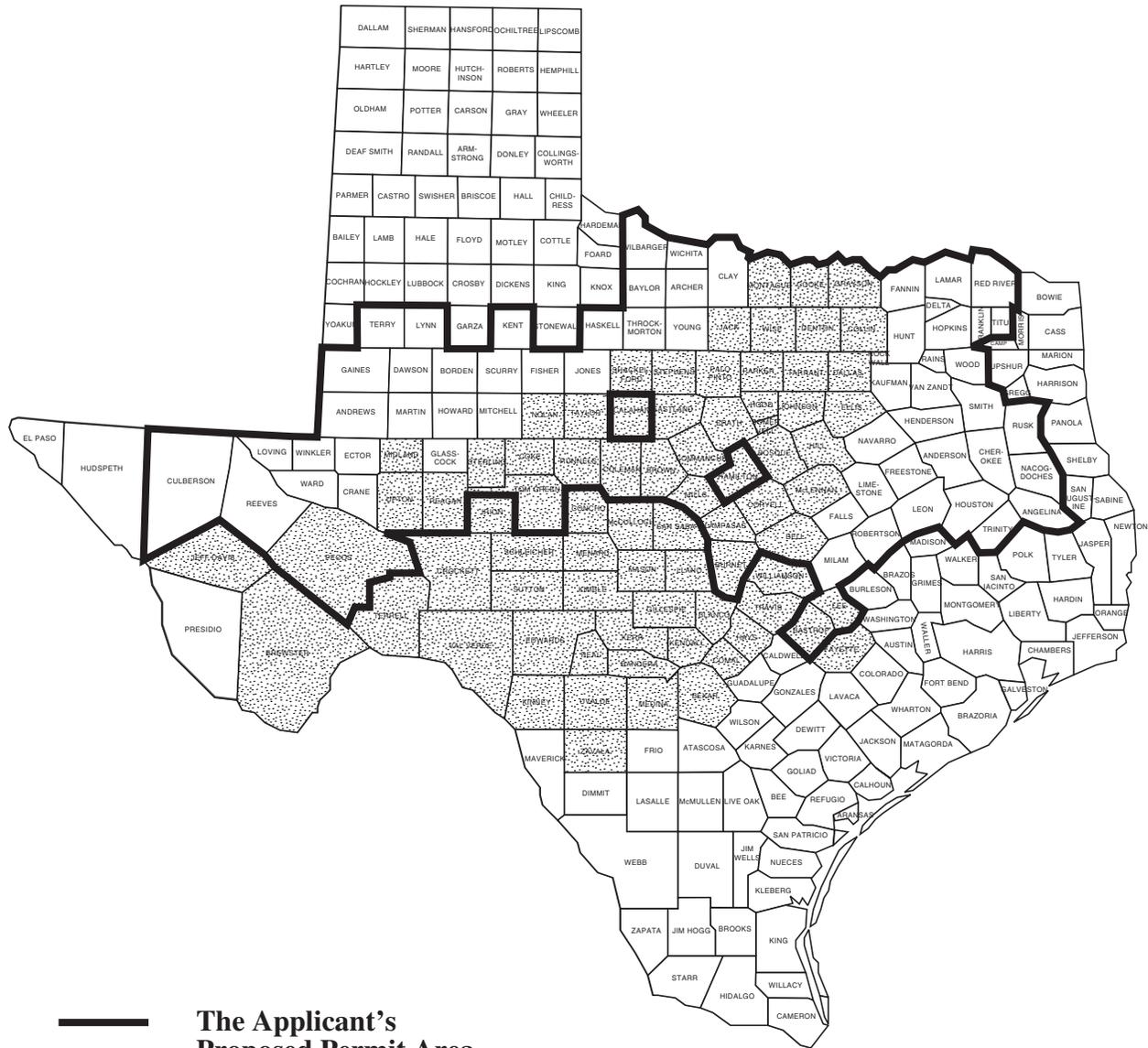
Range: The black-capped vireo formerly bred from Kansas through Oklahoma and Texas to central Coahuila, Mexico, with a colony in Nuevo Leon, Mexico, and summer records of accidentals in Nebraska, New Mexico, Louisiana, and the base of Cerro Potosi in southern Nuevo Leon (Marshall et al. 1985). The present known breeding range extends from central Oklahoma through Dallas, the Edwards Plateau, Concho Valley, Callahan Divide, and Big Bend National Park in Texas, to the Mexican states of Coahuila, Nuevo Leon, and Tamaulipas (Wilkins et al. 2006). The species winters entirely in Mexico along the Pacific slopes of the Sierra Madre Occidental Mountains from southern Sonora, Sinaloa, and Durango south to Guerrero and Oaxaca (American Ornithologists' Union 1998, Wilkins et al. 2006).

Given that black-capped vireo habitat is difficult to identify from aerial photography or satellite imagery, and because much of the private land with potential black-capped vireo remains unsurveyed, the total black-capped vireo population is unknown. Nevertheless, recent data indicate that the number of black-capped vireos is increasing. Marshall et al. (1985) estimated the population to be between 250 and 525 pairs. In 1991, the number of male black-capped vireos in the U.S. was approximately 1,000 (Service 1991b). By 2005, this number had increased to 5,996 males in the U.S., with a total of 6,269 males if Mexico is included (Wilkins et al. 2006). Although some of this increase can be attributed to increased survey efforts, the increase in population size is real, as several long-term monitoring studies have demonstrated (Service 2007).

Distribution in the Proposed Permit Area: The black-capped vireo has been recorded from 43 counties within the proposed Permit Area, from Montague and Grayson counties in the Red River Valley south to Bastrop County and west to Pecos County (Grzybowski 1995, Lockwood and Freeman 2004, Pulich 1988, Service 1995a, 2004b, 2010, Sexton et al. 1989, Wilkins et al. 2006) (Figure 3-9). It currently breeds in 36 counties within the proposed Permit Area: Bell, Bosque, Brown, Burnet, Coke, Coleman, Comanche, Cooke, Coryell, Dallas, Eastland, Erath, Hamilton, Hill, Hood, Jack, Johnson, Lampasas, McLennan, Midland, Montague, Nolan, Palo Pinto, Parker, Pecos, Reagan, Runnels, Shackelford, Somervell, Stephens, Sterling, Taylor, Tom Green, Upton, Wells, and Wise (Wilkins et al. 2006, Omar Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2010, D. Green and G. Newgord, PBS&J, pers. observations). D. Green and G. Newgord (PBS&J) heard several singing male black-capped vireos throughout the breeding season in Brown and Comanche counties in 2008 and have assumed that breeding was occurring (Green and Newgord, pers. observations). A population of the black-capped vireo was recently discovered in Cooke County in 2007 (Omar Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2010) and another small population was previously discovered in Montague County (Lockwood and Freeman 2004). In two counties (Mills and Stephens), the black-capped vireo has not been recorded since 1995 (Wilkins et al. 2006, Service unpublished records).

Reasons for Decline: The Recovery Plan for the black-capped vireo (Service 1991b) identified several threats/reasons for listing, including population decline, low reproductive success, low recruitment of breeding age birds in colonies, nest parasitism by brown-headed cowbirds (see golden-cheeked warbler, above), direct habitat destruction, habitat loss or deterioration through control of natural processes, and indirect effects of land use. The recent 5-year status review of the black-capped vireo by the Service states that habitat loss, grazing and browsing, brood parasitism, imported red fire ants, and vegetational succession remain the primary threats to the species, although the relative importance of each of these threats may have changed since 1987 when the species was listed (Service 2007).

According to the status review, habitat loss and fragmentation due to the conversion of rangeland to other uses as likely decreased the amount of habitat for the black-capped vireo in Texas, particularly on the Edwards Plateau. The status review also found that while fewer domestic livestock, particularly goats, may have decreased the overall threat from grazing and browsing, grazing and browsing still remain a



 **The Applicant's Proposed Permit Area**
 **Known County Records**



- Engineering
- Environmental Consulting
- Surveying

Figure 3-9
BLACK-CAPPED VIREO
(Vireo atricapilla)

Source: Pulich (1988); Sexton et al. (1989); Service (1995a, 2004c, 2010); Grzybowski (1995); Lockwood and Freeman (2004); Wilkins et al. (2006)

threat, particularly since populations of browsing ungulates such as the white-tailed and exotics have increased. The threat of brood parasitism by the brown-headed cowbird has decreased. Apart from the reduced cowbird populations, cowbird trapping and removal efforts have likely reduced parasitism rates on many of the managed preserves. Predation from red imported fire ants also remains a threat. Finally, vegetational succession, such as the invasion of Ashe juniper into formerly open rangeland, has impacted habitat for the black-capped vireo. The status review attributes this threat of vegetational succession to fire suppression, overgrazing, and drought, among other factors (Service 2007).

3.2.4.4 Red-Cockaded Woodpecker (*Picoides borealis*)

Status: Endangered (35 *Federal Register* 8495, 2 June 1970) without critical habitat.

Description: The red-cockaded woodpecker is a small (8.5 inches or 21.6 centimeters) black-and-white woodpecker with a barred back and wings (called a ladderback), black tail, black mustache, and a prominent white cheek that distinguishes this species from other woodpeckers within its range. While the males have a small patch of red “cockade” feathers on the side of the nape behind the eye near the ear (hence the name), these feathers are not obvious unless the bird is in the hand, thus rendering the sexes virtually indistinguishable in the field apart from some behavioral traits (e.g., foraging strata). The immatures are browner and may have red on the center of the crown (Farrand 1983). Breeding for this species begins as early as late February, with the peak nesting period from April through May.

Habitat: The red-cockaded woodpecker inhabits open, park-like stands of pine forests in the southeastern U.S., with a known preference for older (>60 years) pines. Historically, these open stands were maintained by frequent, natural fires that reduced the density of the understory and midstory of the community and maintained a desirable basal area of pines. The red-cockaded woodpecker frequently selects longleaf pine, for which the bird may have a particular affinity, slash pine, loblolly pine, shortleaf pine, pitch pine (*Pinus rigida*), and pond pine (*Pinus serotina*) for nest and roost sites (Jackson 1994, Thompson and Baker 1971).

The species excavates cavities for nesting and roosting almost exclusively in old living pine trees with a diameter at breast height of around 10 inches (25 centimeters) and usually infected with red heart fungus (*Phellinus pini*). Older trees are more frequently infected with this fungus, which softens the tough heartwood, and will more often have a heartwood diameter (at least 5.5 to 6.3 inches [14 to 16 centimeters]) sufficient for cavity excavation. This may explain the red-cockaded woodpecker’s marked preference for old-growth trees (Conner et al. 2001, Service 1985b). Cavities are generally constructed at a height from 20 to 80 feet (6 to 24 meters), taking up to 16 or more years to complete. Certain cavity trees may be used by the same group for several generations (Campbell 2003, Conner et al. 2001). Cavity tree clusters, or aggregations of cavity trees utilized by single-family units, are ideally at least 10 acres (4 hectares) of solid pine forest with few midstory species reaching no more than 15 feet (4.6 meters) in height (Campbell 2003). Encroachment of hardwoods in the midstory around cavity trees can lead to abandonment of the cavity; however, it is important that a sparse midstory of pines is

maintained as a source of future cavity trees. Territories, including the cavity tree cluster and adjacent foraging habitat, can be from 100 to 250 acres or 40 to 101 hectares (Hooper et al. 1980).

Preferable foraging substrates within the red-cockaded woodpecker's home range are pine trees more than 30 years of age in pine or mixed pine-hardwood stands composed of at least 50 percent pine. Red-cockaded woodpecker diets consist primarily of insects (85 percent), supplemented by fruits and seeds (15 percent) (Campbell 2003, Service 1995a).

The red-cockaded woodpecker has a unique social structure, unlike other woodpeckers where the social unit typically consists solely of the breeding pair. The red-cockaded woodpecker's social unit is composed of anywhere from two to nine birds (Hooper et al. 1980), including the breeding male and female and one or more offspring, usually males, from previous broods. Typically, members of the group, or clan, occupy cavities singly. A group may use between 1 and 30 living pines as cavity trees, which are usually clustered relatively close together (Campbell 2003). An active cluster, sometimes called a colony, is one that is occupied by at least one red-cockaded woodpecker. An inactive cluster is one that is no longer occupied by red-cockaded woodpeckers, either through abandonment or death of the occupants.

Range: The historical range of the red-cockaded woodpecker extended from Texas, primarily east of the Trinity River, to the Atlantic seaboard and as far north as Maryland (Hooper et al. 1980). Today, the red-cockaded woodpecker occurs in the southeastern U.S. from Virginia south to Florida and west to Oklahoma and Texas (Jackson 1994).

Distribution in Texas: The red-cockaded woodpecker was once found in 34 Texas counties (Service 1995a); currently, it occurs in 17 of these counties: Angelina, Cherokee, Hardin, Houston, Jasper, Liberty, Montgomery, Nacogdoches, Newton, Polk, Sabine, San Augustine, San Jacinto, Shelby, Trinity, Tyler, and Walker counties (Lockwood and Freeman 2004, Service 2010). In Texas, the clusters are found on state and Federal lands (88 percent), usually national forests, with a small percentage known to occupy private lands. Currently, approximately 374 active clusters occur in Texas, an increase of approximately 8 percent in 4 years (Omar Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2010).

Distribution in the Proposed Permit Area: As shown on Figure 3-10, the red-cockaded woodpecker currently is known from Houston, Angelina, Nacogdoches, Trinity, and Cherokee counties in the eastern part of the proposed Permit Area (Lockwood and Freeman 2004, Service 2010).

Reasons for Decline: The loss of contiguous stands of quality old-growth pine forest for nesting, as well as foraging habitat, caused by short-term rotation timber management on Federal, state and private lands has had the greatest impact on the red-cockaded woodpecker (Service 1995a, Campbell 2003). Loss of mature pines to pine beetle infestation has also contributed to the loss of quality cavity trees, particularly during epidemics (Campbell 2003).

Another major factor in this species' decline is the suppression of fire in the forest ecosystem. Fire has naturally inhibited the overgrowth of the understory and midstory, particularly hardwoods, in red-cockaded woodpecker cavity tree clusters (Conner et al. 2001).

3.2.5 Mammals

3.2.5.1 Louisiana Black Bear (*Ursus americanus luteolus*)

Status: Threatened (57 *Federal Register* 588, 7 January 1992); with critical habitat (74 *Federal Register* 10349, 10 March 2009). Other free-living black bears of the species *Ursus americanus* (American black bear) occurring in east Texas and other areas within the historic range of the Louisiana black bear are designated as threatened due to similarity of appearance under the authority of the Act (57 *Federal Register* 588, 7 January 1992). A special rule allows for normal forest management activities to occur within the bear's range, aside from those that may cause damage to or loss of den trees, den sites, or candidate den trees in occupied Louisiana black bear habitat. Candidate den trees include bald cypress and tupelo (*Nyssa* sp.) with visible cavities, having a diameter at breast height of at least 36 inches (91 centimeters), and occurring in or along rivers, lakes, streams, bayous, sloughs, or other waterbodies (64 *Federal Register* 41903–41905, 2 August 1999).

Description: One of 16 recognized subspecies of the American black bear (Service 1995b), the Louisiana black bear, is a medium-sized bear, weighing up to 400 pounds (880 kilograms), usually with black hair. Individuals may have a white patch on the lower throat and chest. The face is typically blunt, with a broad yellowish brown muzzle, and each foot has short, curved claws. This subspecies was separated from other black bears on the basis of morphological differences showing the Louisiana black bear to have a relatively longer, narrower, flatter skull, with proportionately large molar teeth (Service 1995b).

Habitat: The Louisiana black bear is a habitat generalist and can range over wide areas in a variety of habitats. Mobile and opportunistic, these largely herbivorous omnivores exploit a variety of foods. Their movements are chiefly determined by the availability of seasonal foods, particularly mast (nuts that typically collect on the forest floor). The size of an area used by an individual bear is related to the diversity of vegetative cover and habitat diversity. Important habitat elements include the availability of hard and soft mast, escape cover, denning sites, corridor habitats, and some freedom from disturbance by man (Service 1992c). Black bears are strongly associated with bottomland hardwood habitat and floodplain forests, although upland hardwood forests, mixed pine-hardwood forests, wetlands, and agricultural fields may also be used (Black Bear Conservation Committee 2005, Service 1995b).

An important spatial feature of black bear habitat is remoteness, which is largely determined by the absence of roads, although bears can tolerate close proximity to humans if sufficient areas of refuge are available. As forests become smaller, more fragmented, and more heavily impacted by humans, the presence of high quality cover for bedding, denning, and escape becomes increasingly important. The conversion of large acreages to commercial pine plantations, improved pasture, residential/commercial development, and other large homogenous land use have decreased the potential bear density in both

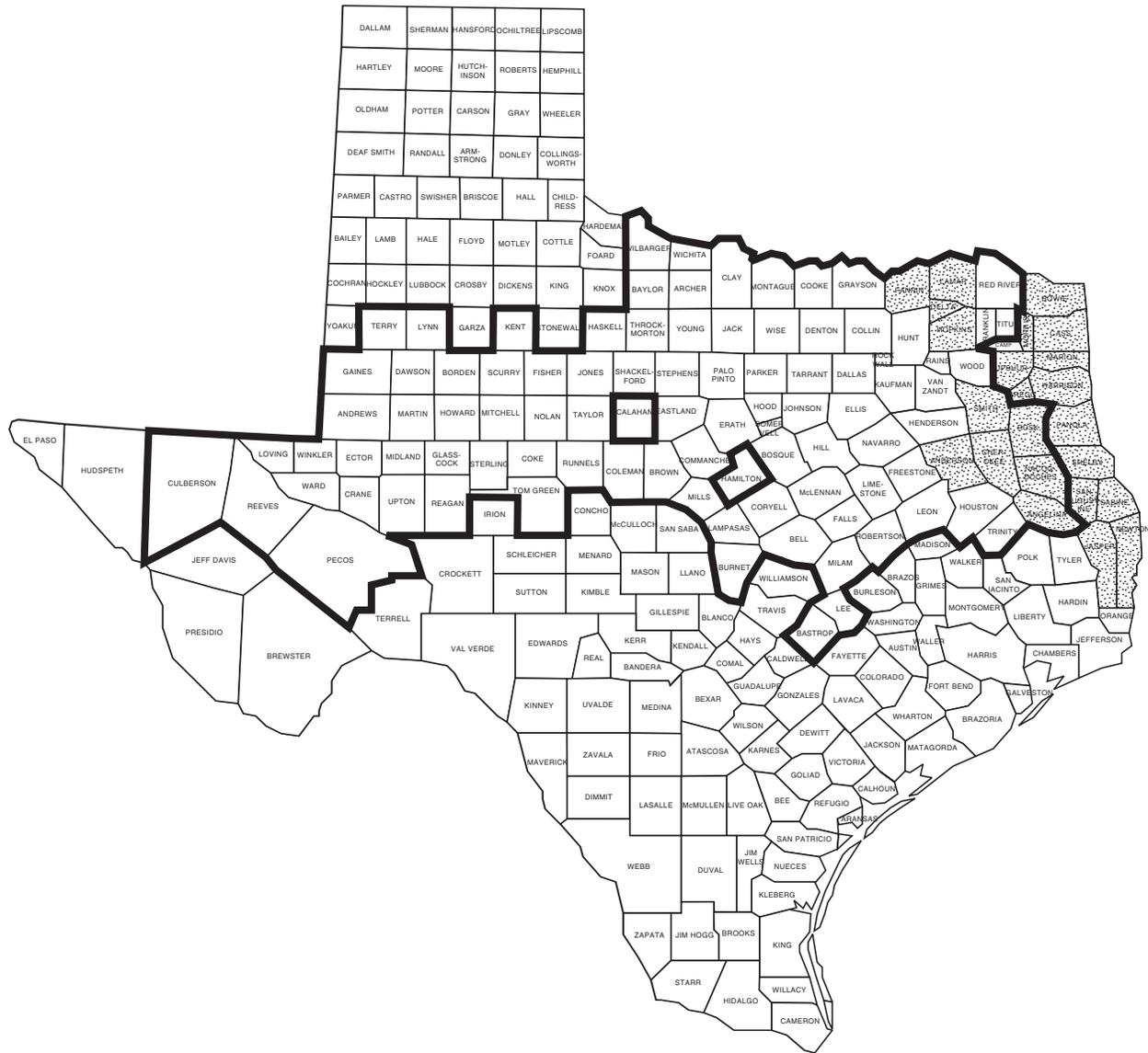
bottomland and upland forest habitat by reducing availability of refuge areas (Service 1995b). However, intensive pine management that incorporates the inclusion of riparian habitats (e.g., streamside management zones) and forest BMPs, can still maintain healthy black bear populations.

Critical Habitat: In 2009, the Service designated 1,195,821 acres (483,932 hectares) of critical habitat for the Louisiana black bear. The Service divided the almost 1.2 million acres (0.49 million hectares) of critical habitat into three units: the Tensas River Basin, the Upper Atchafalaya River Basin, and the Lower Atchafalaya River Basin. All three units occur within the State of Louisiana (74 *Federal Register* 10349, 10 March 2009).

Range: The historical distribution of the Louisiana black bear in Texas included all counties east of and including Cass, Marion, Harrison, Upshur, Rusk, Cherokee, Anderson, Leon, Robertson, Burleson, Washington, Lavaca, Victoria, Refugio, and Aransas, through Louisiana and southern Mississippi. Some authorities include southern Arkansas within the historic range, but no scientific specimens exist to confirm this. Eight of the historical counties in Texas lie within the proposed Permit Area: Rusk, Anderson, Cherokee, Nacogdoches, Angelina, Houston, Leon, and Robertson (Service 1995b). Currently, only three breeding populations of the Louisiana black bear are known to occur: one in the Tensas River Basin and two in the Atchafalaya River Basin in Louisiana. All three breeding populations are considered demographically isolated (Texas Parks and Wildlife Department 2005). Although sightings have been reported outside of these two river basins, it is not known if they represent breeding populations or transient individuals. Additional areas may be occupied in Louisiana and Mississippi (Service 1995b).

Distribution in the Proposed Permit Area: According to the Service (2010), the Louisiana black bear has been recorded from 10 counties within the proposed Permit Area. They are as follows: Fannin, Lamar, Delta, Hopkins, Smith, Rusk, Anderson, Cherokee, Nacogdoches, and Angelina (Figure 3-11). As noted above, the current breeding range is limited to two river basins in Louisiana (Texas Parks and Wildlife Department 2005). Occasional sightings of black bears within the eastern portions of the proposed Permit Area probably result from released captives, or transients from other states (Barker et al. 2004, Taylor 1999, 2000). In 1998 and 1999, black bears were reported from Angelina, Hopkins, and Lamar counties within the proposed Permit Area. It is unknown whether these bears were the Louisiana black bear or the American black bear. In 1999 one of at least two black bears reported in Hopkins County was killed on Interstate Highway (30) I-30 near the Hopkins-Franklin county line (Taylor 1999). While it is unknown whether the scattered reports of black bears from east Texas were of the Louisiana black bear or the American black bear, all black bears occupying the historical range of the Louisiana black bear are protected as threatened due to similarity of appearance (57 *Federal Register* 588, 7 January 1992).

Reasons for Decline: Although Louisiana black bears were eliminated from much of their former range by hunting (Schmidly 1983), the primary threat to the Louisiana black bear today is habitat destruction or modification. In addition to a reduction in the amount of available habitat, remaining forested areas are



— The Applicant's Proposed Permit Area

 Known County Records

PBS&J • Engineering
• Environmental Consulting
• Surveying

Figure 3-11
LOUISIANA BLACK BEAR
(*Ursus americanus luteolus*)

Source: Service (2010)

becoming increasingly fragmented and are often less productive as black bear habitat due to habitat conversion. Further habitat losses could reduce bear populations below the minimum requirements for long-term viability (Service 1995a). The Louisiana black bear is not an old-growth forest species, nor can it survive in open cropland conditions. Normal silviculture practices, such as timber harvest, can actually result in improved bear habitat. The dense regrowth that usually follows timber clearing can provide abundant food and shelter for bears. It is, therefore, believed that the principal threat to this bear is not from normal forest management, but from conversion of timbered tracts to agricultural use. Fragmentation and degradation of habitat can also exacerbate interactions with humans and put black bears at more risk of exposure to various mortality factors (*57 Federal Register* 588, 7 January 1992).

As the population of Louisiana black bears approaches the minimum viable threshold, any loss of that population becomes more significant. Natural mortality factors include disease, cannibalism, drowning, improper maternal care, and climbing accidents. Direct mortality from human causes includes hunting; trapping; poaching; collisions with vehicles, trains, and farm equipment; electrocution; depredation/nuisance kills; disturbance (causing den abandonment); and accidents related to research. In Mississippi and Louisiana, the greatest mortality factors are poaching and road kills. During times of low food availability, black bears tend to wander and are, thus, more likely to come into conflict with humans and their crops, livestock, and vehicles (*57 Federal Register* 588, 7 January 1992).

A more uncertain threat to the Louisiana black bear is hybridization with other genetic stock. In the mid-1960s, 161 to 163 bears of the subspecies *Ursus americanus americanus* were introduced into the Atchafalaya and Tensas river basins from Minnesota.

3.3 OTHER SPECIES OF SPECIAL INTEREST

Several other federally listed species, as well as several candidate species, occur in the proposed Permit Area. These species are briefly discussed below. The Applicant believes that by using the avoidance, minimization, and conservation measures and other BMPs established by the Conservation Program (Section 6) of this HCP, and because of the limited distribution or transient nature of some of these species within the proposed Permit Area, impacts to these species can be avoided. Furthermore, mitigation measures in place for the 11 covered species may collaterally benefit some of these other species of special interest. For example, Cienegas are rare ecosystems that often support numerous sensitive species. Desert wetlands in the Diamond Y Springs Nature Preserve in Pecos County support a large population of Pecos sunflower as well as the endangered Leon Springs pupfish and Pecos gambusia (see below), and three rare aquatic snails (Seiler et al. 1981, The Nature Conservancy of Texas n.d.). Desert wetlands in East Sandia Springs Nature Preserve also support two endangered fish, the Comanche Springs pupfish and Pecos gambusia, rare snails, and the Pecos sunflower (The Nature Conservancy of Texas n.d.). Cienegas in New Mexico's Bitter Lake National Wildlife Refuge support four aquatic invertebrates recently proposed for listing by the Service (*67 Federal Register* 6459, 12 February 2002) and three sensitive plant species in addition to the Pecos sunflower (NatureServe 2009). No incidental take authorization for these species is being requested.

3.3.1 Federally Listed Species and Species Proposed for Listing

Prior to commencement of covered activities and during routing new facilities, covered projects will be assessed on a project-by-project basis for the likely occurrence of federally listed species for which incidental take is not authorized under this HCP. When covered projects are proposed in counties identified as within the range of these species within the proposed Permit Area, the Applicant or its consultant will conduct field habitat assessment surveys to determine potential habitat or occupancy. The need for surveys will be determined by reviewing updated records of known occurrences, spatial data pertinent to habitat requirements (e.g., NRCS Soil Surveys, National Wetland Inventory Maps, and others), and aerial photography. In addition, consultation with Federal and state biologists and other experts will be continued. Where such circumstances exist and avoidance is not practicable to eliminate impact potential, the Applicant will seek an individual section 10(a)(1)(B) incidental take permit on a project-by-project basis. Thirteen federally listed species and 1 species proposed for Federal listing are discussed in the following paragraphs.

The 13 federally listed and 1 proposed federally listed species are discussed briefly below. The 13 federally listed species consist of 2 plants, the endangered Texas prairie dawn-flower (*Hymenoxys texana*) and a threatened plant with no common name (*Geocarpon minimum*); 2 endangered invertebrates, the Pecos assimineia snail (*Assimineia pecos*) and the Bee Creek Cave harvestman (*Texella reddelli*); 3 endangered fish, the Leon Springs pupfish (*Cyprinodon bovinus*), Comanche Springs pupfish (*Cyprinodon elegans*), and Pecos gambusia (*Gambusia nobilis*); 1 reptile, the threatened Concho watersnake (*Nerodia paucimaculata*); and 5 birds, the endangered northern aplomado falcon (*Falco femoralis septentrionalis*), interior least tern (*Sterna antillarum*), and southwestern willow flycatcher (*Empidonax traillii extimus*), and the threatened piping plover (*Charadrius melodus*) and Mexican spotted owl (*Strix occidentalis lucida*). The dunes sagebrush lizard (*Sceloporus arenicolus*) has recently been proposed to be federally listed as endangered (75 *Federal Register* 77801–77817, 14 December 2010).

3.3.1.1 Texas Prairie Dawn-flower (*Hymenoxys texana*)

Status: Endangered (51 *Federal Register* 8681, 13 March 1986) without critical habitat.

Description/Habitat: The Texas prairie dawn-flower, a member of the sunflower family (Asteraceae), is a small (up to 15 centimeters [6 inches]), single-stemmed or branching wildflower that blooms from mid-March through mid-April. It is endemic to the Gulf Prairies and Marshes Vegetational Area of Texas described by Hatch et al. (1990). It occupies a specific niche within the open grasslands of these vegetational regions, occurring on the lower slopes and adjacent bare depressions and swales of mima (or pimple) mounds or where the mima mounds have been leveled, often for agricultural purposes, and the areas have long since been allowed to naturally revegetate (Poole and Riskind 1987, Service 1989, Texas Parks and Wildlife Department 1996a). The most serious threat to the Texas prairie dawn-flower is the permanent loss of habitat due to the rapid expansion of the Houston metropolitan area. Many populations have already been lost due to residential and highway construction (Service 1989).

Range: The Texas prairie dawn-flower is known only to occur in Texas in the following four counties: Fort Bend, Harris, Lamar, and Trinity.

Distribution in the Proposed Permit Area: The species is known to occur only in Lamar and Trinity counties within the proposed Permit Area.

3.3.1.2 *Geocarpon minimum*

Status: Threatened (52 *Federal Register* 22930, 16 June 1987) without critical habitat.

Description/Habitat: *Geocarpon minimum* (no common name) is a small (0.4–1.6 inches [1–4 centimeters] tall), ephemeral, succulent winter annual that is usually easily visible for only 3 to 6 weeks during the spring from late February to early June, while in its flowering and fruiting period. This species is comprised of three populations, all in northeast Texas, which were first confirmed in early 2004 in Anderson County, and occur in a saline barren complex at the vegetative (microflora) edge of saline slicks (barren spots), just above the floodplain of the Neches River (Texas Parks and Wildlife Department 2009a).

Range: *Geocarpon minimum* is known to occur in Arkansas, Louisiana, Missouri, and Texas. Within Texas it is known to occur in Anderson, Harrison and Panola counties.

Distribution in the Proposed Permit Area: This species only occurs in Anderson County within the proposed Permit Area.

3.3.1.3 *Pecos Assiminea Snail (Assiminea pecos)*

Status: Endangered (70 *Federal Register* 46303, 9 August 2005) with critical habitat (70 *Federal Register* 46303, 9 August 2005) and proposed critical habitat revisions (75 *Federal Register* 35375, 22 June 2010)

Description/Habitat: The Pecos *assiminea* snail is an amphibious gastropod that occupies four widely separated portions of the Rio Grande region in the southwestern United States (Pecos River basin) and northeastern Mexico (Cuatro Ciénegas basin). Two critical habitat units have been established for this species in Texas: one unit in Pecos, County Texas at The Nature Conservancy of Texas' Diamond Y Spring Complex, and one unit in East Sandia Springs in Reeves County, Texas (Service 2005b). The Diamond Y Spring Critical Habitat Unit comprises a major population of Pecos *assiminea* (Service 2005b). This unit includes Diamond Y Spring and approximately 4.2 miles (6.8 kilometers) of its outflow ending approximately 0.5 mile (0.8 kilometer) downstream of the State Highway 18 bridge crossing and approximately 0.5 mile (0.8 kilometer) of Leon Creek upstream of the confluence with Diamond Y Draw (Service 2005b). The East Sandia Springs unit includes the springhead itself, surrounding seeps, and all submergent vegetation and moist soil habitat found at the margins of these areas (Service 2005b). This designation is approximately 16.5 acres (6.7 hectares) of aquatic and neighboring upland habitat. The site is private land managed as a nature preserve by The Nature Conservancy of Texas.

Range: This species is only known to occur in New Mexico and Texas. Within Texas it is known to occur in 2 counties: Pecos and Reeves.

Distribution in the Proposed Permit Area: Both Pecos and Reeves counties are within the proposed Permit Area.

3.3.1.4 Bee Creek Cave Harvestman (*Texella reddelli*)

Status: Endangered (53 *Federal Register* 36029, 16 September 1988) without critical habitat.

Description/Habitat: The Bee Creek Cave harvestman is a cave inhabitant with well-developed, conical eyes. Its body is 1.9 to 3 millimeters (0.07 to 0.12 inch) in length and its legs can be from 4.9 to 7.6 millimeters (0.2 to 0.3 inch) long. Adult Bee Creek Cave harvestman can be observed walking in a slow, deliberate fashion over damp rocks or silt on the cave floor, while juveniles tend to be found beneath the rocks. Although little is known of this species, it is thought to prey upon collembolans or other microarthropods, similar to the better-known harvestman species in the same family (Service 1994b).

Range: The Bee Creek Cave harvestman has been recorded from Travis County (Campbell 2003, Service 2010). The Service (2010) also lists this species for Burnet County, although Campbell (2003) does not. The records of the Bee Creek Cave harvestman from Burnet County may be dubious (Dorinda Scott, Texas Natural Diversity Database, pers. comm. to G. Newgord, PBS&J, November 2009).

Distribution in the Proposed Permit Area: May occur in Burnet County within the proposed Permit Area.

3.3.1.5 Leon Springs Pupfish (*Cyprinodon bovinus*)

Status: Endangered (45 *Federal Register* 54678, 15 August 1980) with critical habitat (45 *Federal Register* 54678, 15 August 1980).

Description/Habitat: The Leon Springs pupfish occurs only in Leon Creek, a flood tributary of the Pecos River in Pecos County. This pupfish grows up to 56 millimeters (about 2.2 inches) in total length and is mostly gray brown with rectangular blotches on the lower side of females. The preferred habitat includes springs, outlet marshes and marshes. The species inhabits quiet water near edges of shallow pools with minimal vegetation. Spring waters usually consist of high levels of silica, sulphates and chlorides, with a salinity range of 10 to 15 parts per thousand. The Leon Spring pupfish was once found in Leon Springs, but the species was extirpated when the spring was impounded and pumped dry. The species was once considered extinct until the species was rediscovered in Diamond Y Springs. The estimated population within Diamond Y Draw is less than 10,000 adults (Thomas et al. 2007). In 1980, the Service designated critical habitat for the Leon Springs pupfish in Diamond Y Spring and its outflow stream, Leon Creek. This is the only known wild population of this species (Service 1980).

Range: This species is endemic to Pecos County, Texas.

Distribution in the Proposed Permit Area: Pecos County is within the proposed Permit Area.

3.3.1.6 Comanche Springs Pupfish (*Cyprinodon elegans*)

Status: Endangered (32 *Federal Register* 4001, 11 March 1967) without critical habitat.

Description/Habitat: The Comanche Springs pupfish occurs in only a small series of springs, their outflows, and manmade irrigation canals near Balmorhea, Texas. Specific locations include Phantom Springs in Jeff Davis County, and San Solomon Springs, Griffin Springs, and Toyah Creek in Reeves County. The Comanche Springs pupfish grows up to 62 millimeters (about 2.5 inches) in total length and is gray-green in color. Preferred habitat includes modified springs and irrigation canals with swift currents and with a temperature range of 20 to 30 degrees Celsius (°C). Actions taken to increase the population include the construction of a small refugium canal in Balmorhea State Park in 1974, the construction of a refugium canal at Phantom Lake Spring in 1993, and the construction of San Solomon Cienega in 1996. In addition, a genetic stock is maintained by the Service at the Dexter National Fish Hatchery (Thomas et al. 2007).

Range: This species is endemic to Texas and known to only occur in three counties: Jeff Davis, Reeves and Uvalde.

Distribution in the Proposed Permit Area: Only Reeves County is within the proposed Permit Area.

3.3.1.7 Pecos Gambusia (*Gambusia nobilis*)

Status: Endangered (35 *Federal Register* 16047, 13 October 1970) without critical habitat.

Description/Habitat: The Pecos gambusia fish occurs in western Texas, including the headwaters of Phantom Lake in Jeff Davis County; San Solomon Springs, Griffin Springs, and East Sandia Springs in Reeves County; and Diamond Y Draw and Diamond Y Springs in Pecos County. The Pecos gambusia grows up to 48 millimeters in total length and is olive in color along the dorsal region with blue-yellow tones along the lateral region. Preferred habitat includes shallow vegetated margins of clear springs high in calcium carbonate. The population of Pecos gambusia has been in decline since the destruction of Leon Springs and Comanche Springs. Decline in population can also be attributed to reduction in habitat, impacts of nonindigenous organisms, hybridization, competition, and predation (Thomas et al. 2007).

Range: This species is known to occur in New Mexico and Texas. Within Texas it only occurs in 3 counties: Jeff Davis, Pecos and Reeves.

Distribution in the Proposed Permit Area: Only Pecos and Reeves counties are within the proposed Permit Area.

3.3.1.8 Concho Watersnake (*Nerodia paucimaculata*)

Status: Threatened (51 *Federal Register* 31412, 3 September 1986) with critical habitat (54 *Federal Register* 27377, 29 June 1989). Proposed for Delisting (73 *Federal Register* 38956, 8 July 2008).

Description/Habitat: The Concho watersnake was listed as threatened in 1986, with critical habitat designated in 1989, and has been proposed for delisting since 2008. It is relatively small and slender compared to other Texas water snakes, with an average length of 16 to 26 inches (40 to 66 centimeters), although it has been known to reach almost 42 inches (107 centimeters). This species was originally known chiefly from riffle areas scattered along approximately 238 miles (383 kilometers) of the Colorado and Concho River drainage basins. The Concho watersnake is strictly confined to water and to the narrow ribbon of shoreline adjacent to its aquatic habitat; its principal habitat being riffles—rock-filled sections of the streambed where a drop in elevation causes the water to run over and through the layers of rock before collecting in a shallow pool (Werler and Dixon 2000).

Range: This species is currently known to occur only in Texas in the following 12 counties: Brown, Coke, Coleman, Concho, Irion, Lampasas, McCulloch, Mills, Mitchell, Runnels, San Saba, and Tom Green.

Distribution in the Proposed Permit Area: The following nine counties are within the proposed Permit Area: Brown, Coke, Coleman, Concho, Lampasas, Mills, Mitchell, Runnels, and Tom Green.

3.3.1.9 Northern Aplomado Falcon (*Falco femoralis septentrionalis*)

Status: Endangered (51 *Federal Register* 6686, 25 February 1986) without critical habitat.

Description/Habitat: It is a small raptor that inhabits coastal prairies, desert grasslands, and open woodlands where it nests on stick platforms constructed on yuccas (*Yucca* spp.), tree branches, and utility poles, often using abandoned raptor or corvid nests (Keddy-Hector 2000). The species ranges from South America north to the southwestern United States. Pesticides, poaching, brush encroachment, and agricultural development are considered the main reasons for population decline (Service 1990c). This species is now a rare summer resident in south Texas and the Trans-Pecos (Lockwood and Freeman 2004). Peterson and Zimmer (1998) consider this species as an accidental in the Trans-Pecos and state that reliable sightings have been reported with increasing frequency in southern New Mexico and western Texas (Jeff Davis and Culberson counties) since the 1990s. Reintroductions of captive-reared falcons have been ongoing in southern Texas since 1987 and were initiated in western Texas in 2002. Reeves County is the only county within the proposed Permit Area where this species has been recorded.

Range: This species is known to occur in Arizona, New Mexico, and Texas. Within Texas it is known to occur in the following 16 counties: Aransas, Brewster, Brooks, Calhoun, Cameron, El Paso, Hidalgo, Hudspeth, Jeff Davis, Kenedy, Kleberg, Matagorda, Presidio, Reeves, Refugio, and Willacy.

Distribution in the Proposed Permit Area: Only Reeves County is within the proposed Permit Area.

3.3.1.10 Least Tern (interior subspecies) (*Sterna antillarum*)

Status: Endangered (50 *Federal Register* 21784, 28 May 1985) without critical habitat.

Description/Habitat: While the American Ornithologists' Union (1998) recognizes three subspecies of the least tern in the U.S., because of taxonomic uncertainties and the fact that, in Texas, the interior and coastal least terns are sympatric and not easily distinguished, the Service listed the interior population of the least tern as *S. antillarum*, defining it, in Texas, as least terns occurring more than 50 miles (80 kilometers) inland. The interior population nests on salt flats; sand and gravel bars within wide, unobstructed river channels; the shorelines of rivers; sandbars or islands as well as shorelines of reservoirs and lakes; sand or gravel pits; dike fields; ash disposal areas of power plants; and active mine sites (Service 1990b).

The interior least tern is migratory and occurs as remnant colonies within its historic range. It has been recorded from numerous counties within the proposed Permit Area, particularly along the Red River. Records are mostly of birds during migration. In reality, interior least terns would likely pass through most of the proposed Permit Area while migrating south to Central and South America in the spring and north to the breeding grounds in the fall.

Range: The interior least tern is known to occur in Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Tennessee, and Texas. Within Texas it is found within the following 42 counties: Bowie, Briscoe, Childress, Clay, Collingsworth, Cooke, Dallas, Delta, Denton, Donley, El Paso, Fannin, Freestone, Gray, Grayson, Gregg, Hall, Hardeman, Hemphill, Hopkins, Hutchinson, Jeff Davis, Lamar, Leon, Limestone, Milam, Montague, Rains, Randall, Red River, Roberts, Starr, Tarrant, Throckmorton, Tom Green, Val Verde, Webb, Wheeler, Wichita, Wilbarger, Wood, and Zapata. Breeding interior least terns are commonly found at three reservoirs in Texas along the Rio Grande River: on the Canadian River in the northern Panhandle, on the Prairie Dog Town Fork of the Red River in the eastern Panhandle, and along the Red River (Texas/Oklahoma boundary) into Arkansas (Texas Parks and Wildlife Department 2009e). Known nesting colonies in Texas occur in Childress, Dallas, Freestone, Hall, Hemphill, Limestone, Roberts, and Tom Green counties (Kirsch and Sidle 1999, McCament 1987, Thompson et al. 1997, Texas Utilities Mining Company 1998, D. Green, PBS&J, pers. observation, 2001).

Distribution in the Proposed Permit Area: The following 21 counties occur within the proposed Permit Area: Clay, Cooke, Dallas, Delta, Denton, Fannin, Freestone, Grayson, Hopkins, Leon, Limestone, Milam, Montague, Rains, Red River, Tarrant, Throckmorton, Tom Green, Wichita, Wilbarger, and Wood.

3.3.1.11 Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

Status: Endangered (60 *Federal Register* 10693, 27 February 1995) with critical habitat (70 *Federal Register* 60885, 19 October 2005)

Description/Habitat: The southwestern willow flycatcher breeds in dense riparian habitats in southwestern North America and winters in southern Mexico, Central America, and northern South America. Most breeding habitats are classified as forested wetlands or scrub-shrub wetlands, while habitat requirements for wintering are not well known. Current status in Texas is essentially unknown with no recent survey data available (Service 2002a). This species has declined greatly in range and abundance in riparian areas of the American southwest, primarily because of habitat loss and degradation of Cottonwood-willow and similar riparian habitats (NatureServe 2009).

Range: This species is known to occur in Arizona, California, Colorado, Nevada, New Mexico, Texas, and Utah. Within Texas it is known to occur within the following 6 counties: Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio.

Distribution in the Proposed Permit Area: This species is known to occur in Culberson County within the proposed Permit Area.

3.3.1.12 Piping Plover (*Charadrius melodus*)

Status: Threatened, except Great Lakes Watershed (50 *Federal Register* 50726, 11 December 1985) critical habitat, in Texas (74 *Federal Register* 23475, 19 May 2009)

Description/Habitat: The piping plover is a statewide migrant that winters along the gulf coast. Piping plover's winter on coastal beaches and sandflats from the Carolinas to the Yucatan and through the Bahamas to the West Indies. Wintering birds in Texas use beaches, sandflats, mudflats, algal mats, and dunes along the coast and adjacent offshore islands, including spoil islands along the Gulf Intracoastal Waterway. Approximately 35 percent of the known global population of piping plovers winters along the Texas Gulf Coast, where they spend 60 to 70 percent of the year. The piping plover population that winters in Texas breeds on the northern Great Plains and around the Great Lakes (American Ornithologist' Union 1998, Campbell 2003, Haig 1992, Haig and Elliott-Smith 2004). Inland records of migrating piping plovers in Texas are scarce (Lockwood and Freeman 2004).

Range: The threatened portion of the species is known to occur in Alabama, Colorado, Connecticut, Delaware, Florida, Georgia, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Puerto Rico, Rhode Island, South Carolina, South Dakota, Texas, Virginia, and Wisconsin. Within Texas it is known to occur in the following 19 counties: Aransas, Brazoria, Calhoun, Cameron, Chambers, Dallas, Delta, Denton, Galveston, Grayson, Jefferson, Kenedy, Kleberg, Matagorda, Nueces, Refugio, San Patricio, Throckmorton, and Willacy.

Distribution in the Proposed Permit Area: The following 5 counties are within the proposed Permit Area: Dallas, Delta, Denton, Grayson, and Throckmorton.

3.3.1.13 Mexican Spotted Owl (*Strix occidentalis lucida*)

Status: Threatened (58 *Federal Register* 14248, 16 March 1993) with critical habitat (69 *Federal Register* 53181, 31 August 2004).

Description/Habitat: The Mexican spotted owl is a medium-sized owl that, in Texas, occurs in the Guadalupe Mountains near the New Mexico border and the Davis Mountains. It inhabits mature, old-growth forests of white pine (*Pinus strobiformis*), Douglas-fir (*Pinus pseudotsuga*), and ponderosa pine (*Pinus ponderosa*) characterized by steep slopes and canyons with rocky cliffs (Texas Parks and Wildlife Department 2009b). The primary reasons for listing the owl as threatened was the historical alteration of its habitat as the result of timber management practices, specifically the use of even-aged silviculture, and the danger of catastrophic wildfire (Service 2004c).

Range: This species is known to occur in Arizona, Colorado, New Mexico, Texas, and Utah. Within Texas it is known to occur within the following 4 counties: Culberson, El Paso, Hudspeth, and Jeff Davis.

Distribution in the Proposed Permit Area: This species only occurs in Culberson County within the proposed Permit Area.

3.3.1.14 Dunes Sagebrush Lizard (*Sceloporus arenicolus*)

Status: Proposed Endangered (75 *Federal Register* 77801, 14 December 2010)

The dunes sagebrush lizard (formerly known as the sand dune lizard) has a limited and often spotty distribution in southeastern New Mexico and adjacent west Texas (New Mexico Game and Fish 2004). The dunes sagebrush lizard appears to be confined to areas of active sand dunes vegetated by shinnery oak, although adjacent open habitats may be used in some places (Degenhardt and Jones 1972, Degenhardt and Sena 1976, Sena 1985). Dunes that become completely stabilized by vegetation are apparently unsuitable for this species. Good habitat for this species contains sand hummocks vegetated with shinnery oak and intervening open blowouts (Dixon 2000).

Range: This species is known to occur in New Mexico and Texas. Within Texas it occurs in the following 7 counties: Andrews, Cochran, Crane, Gaines, Ward, Winkler, and Yoakum.

Distribution in the Proposed Permit Area: The following five counties occur within the proposed Permit Area: Andrews, Crane, Gaines, Ward, and Winkler.

3.3.2 Candidate Species

Candidate species are those species for which enough information about their vulnerability and threat(s) is available to propose them for listing as endangered or threatened. However, listing of these species is typically precluded by higher priority listing activities. The 15 candidate species discussed briefly below consist of 3 plants, the Guadalupe fescue (*Festuca ligulata*), Neches River rose-mallow (*Hibiscus*

dasycalyx), and Texas golden gladecress (*Leavenworthia texana*); 5 aquatic invertebrates, the Phantom Lake Cave snail (*Cochliopa texana*), Diamond Y Spring snail (*Pseudotryonia* [=Tryonia] *adamantina*), Phantom Spring snail (=tryonia) (*Tryonia cheatumi*), Gonzales Spring snail (*Tryonia circumstriata* [=stocktonensis]), and diminutive amphipod (*Gammarus hyalleloides*); 2 fish, the smalleye shiner (*Notropis buccula*) and sharpnose shiner (*Notropis oxyrhynchus*); 1 amphibian, the Salado salamander (*Eurycea chisholmensis*); 1 reptile, the Louisiana pinesnake (*Pituophis ruthveni*); and 3 birds, the lesser prairie-chicken (*Tympanuchus pallidicinctus*), yellow-billed cuckoo (*Coccyzus americanus*), and Sprague's pipit (*Anthus spragueii*).

3.3.2.1 Guadalupe Fescue (*Festuca ligulata*)

Status: Candidate, Listing Priority: 11, Magnitude: Moderate to Low, Immediacy: Nonimminent

Description/Habitat: Guadalupe fescue is a loosely tufted perennial grass growing up to 32 inches (81 centimeters) in height. The only known population is in the Chisos Mountains in the Big Bend National Park in Brewster County, Texas, where it inhabits pine-oak-juniper woodlands on mesic slopes and in creek bottoms above 5,900 feet (1,800 meters). Two historical sites in Culberson County, which is within the proposed Permit Area, have been extirpated. Threats to the population in Big Bend National Park include changes in the wildfire cycle and vegetation structure, trampling from humans and pack animals, grazing, trail runoff, invasive plants and animals, and fungal infection of seeds (Poole et al. 2007, Service et al. 2008).

Range: This species is known to only occur in Texas in 2 counties: Brewster and Culberson.

Distribution in the Proposed Permit Area: Within the proposed Permit Area, this species is only known to occur in Culberson County.

3.3.2.2 Neches River Rose-mallow (*Hibiscus dasycalyx*)

Status: Candidate, Listing Priority: 5, Magnitude: High, Immediacy: Nonimminent

Description/Habitat: The Neches River rose-mallow is a perennial herb found in wetlands with areas of open sun. Populations are generally located within the floodplain of a permanent stream, river or other body of water that is flooded at least once a year. The plant bases are normally standing in water in these lowland terrains, with the water level dropping but the soil remaining wet until very late in the season. The known populations are located within the floodplains of the Angelina, Neches, and Trinity rivers and most occur on private land or highway rights-of-way. Each population covers less than 10 acres or 4 hectares (Creech et al. 2004, Warnock 1995).

Range: This species is endemic to Texas and known only to occur in three counties: Cherokee, Trinity and Houston.

Distribution in the Proposed Area: All three counties within this species' range are within the proposed Permit Area.

3.3.2.3 Texas Golden Gladecress (*Leavenworthia texana*)

Status: Candidate, Listing Priority: 2, Magnitude: High, Immediacy: Imminent

Description/Habitat: The Texas golden gladecress occurs in the wild on shallow calcium-containing soils on ironstone outcrops of unusual geological regions called the Weches Formation and has a flowering and fruiting period from late February to April or May (Center for Plant Conservation 2005). This glabrous winter annual, which is less than 4 inches (10 centimeters) tall, is threatened due to pasture improvement, encroachment of woody exotics, road construction and maintenance, herbicide use, residential development, and open-pit mining of Weches glauconite (Poole et al. 2007).

Range: This species is endemic to Texas and only known to occur in 3 counties: Nacogdoches (experimental population), San Augustine and Sabine.

Distribution in the Proposed Permit Area: An experimentally introduced population occurs in Nacogdoches County, which is within the proposed Permit Area.

3.3.2.4 Phantom Lake Cave Snail (*Cochliopa texana*) and Phantom Spring Snail (*Tryonia cheatumi*)

Status (for both species): Candidate, Listing Priority: 2, Magnitude: High, Immediacy: Imminent

Description/Habitat (for both species): The Phantom Lake Cave snail and the Phantom Spring snail are aquatic snails occurring in only three spring systems and associated outflows (Phantom Lake, San Solomon, and East Sandia springs) in the Toyah Basin of Jeff Davis County and Reeves County, Texas. They are found on both soft and firm substrates on the margins of spring outflows and are most abundant in the first few hundred meters downstream of spring outlets. The most significant threat to these species is the degradation and eventual loss of spring habitat (flowing water) due to the decline of groundwater levels supporting the aquifer (Taylor 1987).

Range (for both species): These species are endemic to Texas and known only to occur in 2 counties: Jeff Davis and Reeves.

Distribution in the Proposed Permit Area (for both species): Only the Reeves County is within the proposed Permit Area.

3.3.2.5 Diamond Y Spring Snail (*Pseudotryonia [=Tryonia] adamantina*) and Gonzales Spring Snail (*Tryonia circumstriata*)

Status (both species): Candidate, Listing Priority: 2, Magnitude: High, Immediacy: Imminent

Description/Habitat (both species): The Diamond Y Spring snail and Gonzales Spring snail are endemic, aquatic snails only known from a spring system (Diamond Y Spring) and associated outflows in Pecos County. These species prefer mud substrates on the margins of small springs and seeps and marshes in flowing water associated with sedges and cattails. They are presumed to be fine-particle feeders of detritus and periphyton within the substrate (Texas Parks and Wildlife Department 2009c). Primary threats to the species include springflow declines from drought, pumping of groundwater, and potentially climate change. Secondary threats including water contamination from pollution, such as accidental oil and gas spills given that these resources are actively extracted from their habitat, and displacement by competitors, most important of which is a recently introduced, nonnative aquatic snail (*Melanoides* sp.) (74 *Federal Register* 57803, 9 November 2009).

Range (both species): These species are endemic to Texas and known only to occur in Pecos County.

Distribution in the Proposed Permit Area (both species): Pecos County is within the proposed Permit Area.

3.3.2.6 Diminutive Amphipod (*Gammarus hyalleloides*)

Status: Candidate, Listing Priority: 2, Magnitude: High, Immediacy: Imminent

Description/Habitat: The endemic diminutive amphipod is a small amphipod that is active mostly at night and spends the daylight hours hiding under vegetation and other cover (Texas Parks and Wildlife Department 2009d). This species is currently known to occur in only four springs in Jeff Davis and Reeves Counties, west Texas, all within about 8 miles (13 kilometers) of each other within the San Solomon Spring System. The most significant threat to this species is habitat destruction by humans (groundwater pumping for agriculture), and loss of spring habitat (flowing water) due to decline of groundwater levels of the supporting aquifer (NatureServe 2009).

Range: This species is endemic to Texas and known only to occur in two counties: Jeff Davis and Reeves.

Distribution in the Proposed Permit Area: Only Reeves County is within the proposed Permit Area.

3.3.2.7 Smalleye Shiner (*Notropis buccula*) and Sharpnose Shiner (*Notropis oxyrhynchus*)

Status (for both species): Candidate, Listing Priority: 5, Magnitude: High, Immediacy: Nonimminent

Description/Habitat (for both species): The smalleye shiner and sharpnose shiner are small freshwater fishes, endemic to the Brazos River drainage basin. However, small introduced populations of both species have occurred in the Colorado River, near Austin (Hubbs et al. 2008, Lee et al. 1980). The smalleye shiner has been recorded in 11 counties within the proposed Permit Area. The sharpnose shiner, which has been recorded in 12 of the proposed Permit Area counties, is decreasing in abundance because

of increased turbidity downstream of reservoirs in the Brazos River basin (Hubbs et al. 2008). Both species can be found in stable populations upstream of Possum Kingdom Reservoir on the Brazos River in Palo Pinto and Young Counties. Downstream of the Reservoir, the smalleye is extirpated and the sharpnose may only exist in relict areas (O. Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2010).

Range: Smalleye Shiner: This species is only known to occur in Texas in the following 16 counties: Baylor, Bell, Bosque, Brazos, Burlison, Fisher, Garza, Haskell, Hill, Kent, King, Knox, Palo Pinto, Stonewall, Throckmorton, and Young.

Range: Sharpnose Shiner: This species is only known to occur in Texas in the following 23 counties: Austin, Baylor, Bosque, Brazos, Burlison, Fisher, Fort Bend, Garza, Grimes, Haskell, Hill, Kent, King, Knox, Milam, Palo Pinto, Robertson, Somervell, Stonewall, Throckmorton, Waller, Washington, and Young.

Distribution in the Proposed Permit Area: Smalleye Shiner: Only the following 11 counties are within the proposed Permit Area for this species: Baylor, Bell, Bosque, Fisher, Haskell, Hill, Kent, Palo Pinto, Throckmorton, and Young.

Distribution in the Proposed Permit Area: Sharpnose Shiner: Only the following 12 counties are within the proposed Permit Area for this species: Baylor, Bosque, Fisher, Haskell, Hill, Kent, Milam, Palo Pinto, Robertson, Somervell, Throckmorton, and Young.

3.3.2.8 Salado Salamander (*Eurycea chisholmensis*)

Status: Candidate, Listing Priority: 2, Magnitude: High, Immediacy: Imminent

Description/Habitat: The Salado salamander is an aquatic neotonic species of salamander approximately 2 inches (5 centimeters) in length. The species is known to occur in two spring sites fed by the Edwards Aquifer near Salado in Bell County, Texas (Chippindale et al. 2000, Service 2002b). Although this species is difficult to find and its status is not well known, primary threats appear to be degradation of water quality and quantity due to urbanization (NatureServe 2009).

Range: This species is currently known to only occur in Texas in Bell County.

Distribution in the Proposed Permit Area: Bell County is within in the proposed Permit Area.

3.3.2.9 Louisiana Pinesnake (*Pituophis ruthveni*)

Status: Candidate, Listing Priority: 5, Magnitude: High, Immediacy: Nonimminent

Description/Habitat: The Louisiana pinesnake is an inhabitant of forests of east Texas and Louisiana. This species is restricted mainly to open longleaf pine-oak sandhills interspersed with moist bottomlands.

It may also occur in adjacent blackjack oak woodlands and in sandy areas of shortleaf pine-post oak forest (Werler and Dixon 2000). The primary prey of this species is the pocket gopher (*Geomys* spp.). The distribution of pocket gopher populations may directly affect that of the Louisiana pinesnake (Tennant 1998).

Range: This species is found in both Louisiana and Texas. Within Texas it is found within the following 10 counties: Angelina, Cherokee, Grimes, Nacogdoches, Jasper, Newton, Sabine, Shelby, Tyler, and Wood.

Distribution in the Proposed Permit Area: Only the following counties are found within the proposed Permit Area: Angelina, Cherokee, Nacogdoches, and Wood.

3.3.2.10 Lesser Prairie-chicken (*Tympanuchus pallidicinctus*)

Status: Candidate, Listing Priority: 2, Magnitude: High, Immediacy: Imminent

Description/Habitat: The lesser prairie-chicken inhabits arid grassland that generally is interspersed with shrubs and small trees (American Ornithologists' Union 1998, Baicich and Harrison 1997). Once numerous in the sagebrush and short-grass prairies in the Texas Panhandle, this species has suffered severe losses in habitat since the turn of the century. Overgrazing, brush control, and farming have reduced the habitat of this species to a remnant of the past (Lionberger 2001). Historically, the lesser prairie-chicken ranged east to Clay and Tarrant counties, and south to Kimble, Crockett, and Pecos counties. Currently, it is a rare to uncommon and local resident in the Panhandle and South Plains. Two disjunct populations occur in Texas. The population on the western South Plains extends from Bailey County south to Gaines and, possibly, Andrews, while the population in the eastern Panhandle occurs from Lipscomb County south to Collingsworth County (Lockwood and Freeman 2004).

Range: This species is known to occur in Colorado, Kansas, New Mexico, Oklahoma, and Texas. Within Texas it is known to occur within the following 24 counties: Andrews, Bailey, Carson, Castro, Cochran, Collingsworth, Deaf Smith, Donley, Gaines, Gray, Hemphill, Hockley, Lamb, Lipscomb, Moore, Ochiltree, Oldham, Parmer, Randall, Roberts, Swisher, Terry, Wheeler, and Yoakum.

Distribution in the Proposed Permit Area: Andrews, Gaines, and Terry counties occur within the proposed Permit Area.

3.3.2.11 Sprague's Pipit (*Anthus spragueii*)

Status: Candidate, Listing Priority: 2; Magnitude: High; Immediacy: Imminent

Description/Habitat: The Sprague's pipit is a relatively small passerine endemic to the North American grasslands. It has a plain buff colored face with a large eye-ring. The Sprague's pipit is a ground nester that breeds and winters on open grasslands. It is closely tied with native prairie habitat and breeds in the north-central United States in Minnesota, Montana, North Dakota and South Dakota as well as south-

central Canada (Service 2010). During migration and winter in Texas, as elsewhere, Sprague's pipits may be found hunting insects and seeds in weedy fields and the vicinity of airports as well as in a wide variety of grasslands (Oberholser, 1974). It is an uncommon migrant, primarily through the center of the state. They are rare to locally uncommon inland to the Post Oak Savannahs and Blackland Prairies from Williamson and Brazos Counties, south through much of the South Texas Brush Country. Wintering Sprague's pipits are rare to locally uncommon in agricultural areas of north-central Texas, the Concho Valley, and the northwestern Edwards Plateau within the Permit Area, and are rare migrants and casual winter residents through the remainder of the state (Lockwood and Freeman, 2004).

Range: This species is known or believed to occur in Arizona, Colorado, Kansas, Louisiana, Minnesota, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, and Texas. Within Texas the species is known to occur Statewide.

Distribution within the proposed Permit Area: Because the Sprague's pipit is known or believed to occur Statewide, all 100 counties within the proposed Permit Area are included in its distribution.

3.3.2.12 Yellow-billed Cuckoo (*Coccyzus americanus*)

Status: Candidate, Listing Priority: 3, Magnitude: High, Immediacy: Imminent

Description/Habitat: The western yellow-billed cuckoo is a riparian habitat specialist and historically occupied floodplain riparian forests below 1,500 feet (457 meters) elevation. It may be more habitat-specific than the willow flycatcher, which will use nonnative species as habitat, although the yellow-billed cuckoo will occupy a variety of marginal habitats, particularly at the edges of its range. Western yellow-billed cuckoos are highly associated with relatively expansive stands of mature cottonwood-willow forests (Laymon and Halterman 1990, Service 1985c). The cuckoos are uncommon and local in the Trans-Pecos region of Texas (Lockwood and Freeman 2004), which is the western edge of the cuckoo's distribution (Hughes 1999).

Range: This species is known to occur in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, and Wyoming. Within Texas it is known to occur in the following six counties: Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio.

Distribution in the Proposed Permit Area: This species is known to occur in Culberson County within the proposed Permit Area.

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4.0 COVERED ACTIVITIES

4.1 EVALUATION OF COVERED ACTIVITIES

In order to evaluate potential take for each species that would be covered by the proposed incidental take permit, the Applicant had to identify possible impacts associated with maintenance and construction activities. The activities to be covered by the proposed incidental take permit were identified so that possible adverse effects to protected species or their habitat could be evaluated. Activities that involved alteration of habitat, disturbance of soils, or use of potentially toxic materials are included because these activities are most likely to result in adverse impacts. Additionally, the Applicant needed to ensure that, if approved, the proposed incidental take permit would cover activities associated with common general, maintenance, and construction actions. Therefore, the Applicant considered all general activities associated with emergency response and restoration, stormwater discharges from construction sites, equipment access, and surveying, as well as typical activities associated with new construction and maintenance. These are the types of activities common to maintaining and constructing their electric transmission and distribution facilities.

The second step was to determine which types of facilities the Applicant wanted to include in the proposed permit. The Applicant determined that it was appropriate to include all of their electric transmission, distribution, and support facilities. This includes overhead and underground transmission and distribution lines and support facilities. Support facilities are defined as substations and switching stations.

4.2 AUTHORIZED ACTIONS (COVERED ACTIVITIES)

The Applicant intends that all of the activities described below would be covered under the proposed incidental take permit. Throughout this document, these activities are referred to as covered projects or covered activities. Details regarding each of the covered activities are presented in Table 4-1.

Typical activities for all of the Applicant's electric transmission, distribution, and support facilities include the following:

- **Emergency response and restoration** – Typically weather related to address storm damage to existing facilities.
- **Stormwater discharges from construction sites** – Stormwater discharges from maintenance and construction activities.
- **Equipment access** – Typically involves driving equipment within rights-of-way. However, clearing, grading, or placement of material above-grade, such as the installation of temporary culverts and fill at creek crossings may be necessary. Staging areas for equipment either occur within the rights-of-way or are rented spaces typically used for such practices. Culverts and fill may also require U.S. Army Corps of Engineers (USACE) permits.

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Table 4-1. Covered Activities Within the Proposed Permit Area

Construction/Maintenance Activities	Activity Description	Excavation/Disturbance ⁽¹⁾	Height of New Electric Lines ⁽²⁾	Area and Depth of Disturbance per pole/structure ⁽³⁾	Equipment	Length of Time to Conduct Activity	Frequency of Activities ⁽⁴⁾
General Activities							
Survey	ROW centerline and support facility surveys prior to construction. Activity may involve hand clearing of vegetation when necessary and placement of stakes along site boundaries.	NA	NA	NA	Foot traffic, four-wheelers, 1/2 ton pickup trucks, and machetes.	ROW: 2 to 3 miles per day Fixed facilities (i.e., substations/switching stations): 1 to 2 days	Ongoing Activity
Access	Equipment access may involve driving equipment up and down ROW only. However, clearing, grading or placement of material above grade such as the installation of temporary culverts and fill at creek crossings may be necessary.	Access roads will be the minimum width necessary (typically 20 feet) and kept at preconstruction contours except at creek crossings (20 feet wide x width of creek) where culverts and fill are necessary or construction site entrances (12 feet wide x 50 feet long), which require the spreading of gravel to prevent tracking of sediment onto roads.	NA	NA	Bulldozers and track loaders, hydroaxes, tractors w/ brush hogs, backhoes, chipper trucks and brush chippers, lift trucks, trucks of various sizes, dump trucks, and tractors	Creek Crossings: 3 hours to 1 day per crossing depending on width and depth of creek ROW Establishment (i.e., vegetation clearing): 1 mile every 2 days depending on type of vegetation to be cleared, width of ROW, terrain, etc. Construction Site Entrances: one installed per day	Ongoing Activity
Emergency Response and Restoration (electric facility outage, etc.)	Activities associated with emergency response work are typically weather-related and address storm damage to transmission/distribution lines, as well as substations/switching stations.	Access and structure/pole replacement disturbances will be roughly the same as the dimensions for access above and new transmission line and distribution line construction below.	Same as dimensions below	Same as dimensions below	Bulldozers, cranes, lift trucks, pickups, four-wheelers, wire carts, and tensioners	Length of time to conduct emergency response work will be similar to the activities listed below; however, more equipment and crews will be on-site to address emergencies in order to reduce outage time, etc. This will result in a decrease in the time it takes to conduct said activities.	Frequency is dependent on inclement weather.
Stormwater Discharges from Construction Sites	Stormwater discharges from maintenance and construction activities permitted by the Texas Commission on Environmental Quality.	NA	NA	NA	NA	Varies depending on magnitude of storm event.	Stormwater discharges may occur throughout active project construction until final stabilization has been reached. Areas will be considered finally stabilized when a uniformly distributed perennial vegetative cover equal to 70% of the native background vegetative cover for the area has been established or equivalent measures have been employed.
New Construction							
New Overhead Transmission Line Construction	Activities include clearing of ROW, excavating for and pouring structure foundations, assembling and setting support structures, installing hardware on support structures, installing new power lines, and final cleanup.	345-kV Line: Laydown space for lattice steel structure including structure footprint = 150 x 75 feet. Width of ROW to be cleared = 160 feet. 138-kV Line: Laydown space for single concrete/steel pole including pole footprint = 50 x 100 feet. Width of ROW to be cleared = 70 to 100 feet. Disturbances from access roads will be the minimum width necessary (typically 20 feet).	345-kV lattice steel structure: 120 feet. 138-kV single concrete/steel pole: 80 to 90 feet.	345-kV lattice steel structure: Approx. 5 structures per mile with 4 piers/3 feet diameter each/ 15 feet deep 138-kV single concrete/steel pole: Approx. 10 poles per mile 10 feet diameter/15 to 30 feet deep	Bulldozers, cranes, lift trucks, pickups, dump trucks, tractors, four-wheelers, wire carts, and tensioners	345-kV/138-kV: 6 miles per month (i.e., structure assembly, pole/structure installation, and pulling wire)	For the past 5 years, approximately 150 miles of new overhead transmission lines have been constructed annually. For the next 5 years, it is projected that an average of about 85 miles of new transmission lines will be constructed annually.
New Overhead Distribution Line Construction	Activities include clearing of ROW, excavating for structure installations, assembling and setting support structures, installing hardware on support structures, installing new power lines, and final cleanup.	12/25-kV single concrete/wood poles: Approx. 28 square feet of disturbance per pole. Width of ROW to be cleared = 12 feet. Disturbances from access roads will be the minimum width necessary (typically 20 feet).	12/25-kV single concrete/wood poles: 30 to 100 feet.	12/25-kV single concrete/wood poles: Approx. 26 poles per mile, 14 inches to 3 feet diameter/5 to 13 feet deep	Trucks of various sizes, rubber-tired hole diggers, pole cats with trailers, and bucket trucks	12/25-kV: 1 mile every 5 days	Net average annual additions of overhead distribution lines are approximately 250 miles.

Table 4-1. Covered Activities Within the Proposed Permit Area

Construction/Maintenance Activities	Activity Description	Excavation/Disturbance ⁽¹⁾	Height of New Electric Lines ⁽²⁾	Area and Depth of Disturbance per pole/structure ⁽³⁾	Equipment	Length of Time to Conduct Activity	Frequency of Activities ⁽⁴⁾
New Support Facility Construction	Switching station and substation construction involving vegetation clearing (if necessary), site grading, spreading of base material (6 inches compacted to 4 inches), addition of 1.5 inches topping rock, drilling of foundations, and installation of electrical equipment.	Switching station footprint: 4 to 10 acres. Substation footprint: 1 to 1.5 acres Disturbances from access roads will be the minimum width necessary (typically 20 feet).	The tallest piece of equipment within support facilities is the deadend structure where transmission lines terminate. 345-kV Deadend: 85 feet in height. 138-kV Deadend: 50 feet in height.	Same as transmission above	Bulldozers, cranes, lift trucks, pickup trucks, dump trucks, tractors, and motor graders	Switching Station: 9 to 12 months Substation: 3 to 6 months	For the past 5 years approximately 2 substations and less than 1 switching station have been constructed annually. Over the next 5 years, about 4 substations and 1 switching station will be constructed annually.
Adding a Second Circuit on Existing Double-Circuit Structures	Activities include installing new wire on the empty side of existing double-circuit structures.	The only potential disturbance for this activity is equipment access up and down ROW and clearing of ROW on the empty side of the double-circuit structure. In some instances, ROW is not maintained on the empty side of the structure and approx. half of the ROW will need to be cleared resulting in 80 feet for 345-kV lines and 35 to 50 feet for 138-kV lines.	NA	NA	Bulldozers, cranes, lift trucks, pickup trucks, trucks of various sizes, dump trucks, tractors, four-wheelers, wire carts, and tensioners	6 to 8 miles per week	For the past 5 years approximately 18 miles of second circuits have been added to existing lines annually. Over the next 5 years, an average of 42 miles of added second circuits is projected.
Underground Electric Installation	Underground electric lines are typically installed in metropolitan areas within residential subdivisions, commercial developments and airports. Activities include clearing of ROW, trenching and/or boring/directional drilling, pipe installation, pipe pressure testing, installation of cable/conductor, splicing of cable, terminating cable, filling with dielectric fluid, cathodic protection installation, and energizing.	Underground Transmission: Trench is approximately 2.5 feet wide x 4 to 5 feet deep. Width of ROW to be cleared is approx. 50 feet Underground Distribution: Trench is 4 inches to 1.5 feet wide x 40 inches deep. Width of ROW to be cleared is approx. 2 feet.	NA	NA	Backhoes, trucks, dump trucks, cranes, boring equipment, directional drilling equipment, and cable-pulling wenchers on rubber-tires or track	Underground Transmission: 1 mile per month Underground Distribution: 10 miles per month	Underground Transmission: Less than 2 miles of new underground electric lines are installed each year. Underground Distribution: Net average annual additions of underground distribution lines are 1,000 miles.
Maintenance Activities							
Vegetation Management	Activities include maintaining ROW via tree trimming/topping, tree removal and/or mowing throughout proposed permit area, as well as weed control around perimeter of substations and switching stations. Reseeding with native species.	In most instances vegetation management activities will be conducted without disturbance using appropriate specific herbicides such as low-volume basal and foliar application and/or handclearing via methods such as chainsaws, trimming or mowing and mechanical aboveground clearing such as hydroaxing. In some cases, bulldozers and/or backhoes are used to maintain ROW.	NA	NA	Chainsaws, hydroaxes, specific herbicides such as low-volume basal or foliar application, mowers, brown tree-cutters, bulldozers, and backhoes	Length of time to conduct activity is dependent on length and width of ROW to be maintained, type of vegetation, terrain, etc.	Transmission: grass mowing is approximately 8 times per year, ROW maintenance is on an 18-month to 6-year cycle, substation and switching station weed-control cycle is on a weekly to monthly basis. Distribution: Vegetation work is not performed on distribution feeders on a regularly scheduled basis because the company has determined that a specific cycle is not the most cost-effective method of vegetation management for its system. See also Footnote 4 below.
Existing Support Facility Expansion	In order to address load increases, additional electrical equipment may have to be installed within substations and at switching sites and will result in an expansion of the substation site boundaries.	Substation expansions are typically 60 x 60 feet.	NA	NA	Bulldozers, cranes, lift trucks, pickup trucks, dump trucks, tractors, and motor graders	Substation expansions at 60 x 60 feet take approx. 1 to 3 months to complete	Approx. 5 substations throughout the proposed permit area are expanded each year.
Line Upgrade-Reconductoring	This activity involves replacing old conductor (wire) with new conductor on existing structures. The voltage stays the same; however, there is more aluminum for an increase of current.	The only potential disturbance for this activity is equipment access up and down ROW.	NA	NA	Bulldozers, cranes, lift trucks, pickups, trucks of various sizes, dump trucks, tractors, four-wheelers, wire carts, and tensioners	6 to 8 miles per week	For the past 5 years, approximately 70 miles of lines have been reconducted on an annual basis. Over the next 5 years it is projected that an average of about 165 miles will be reconducted annually.

Table 4-1. Covered Activities Within the Proposed Permit Area

Construction/Maintenance Activities	Activity Description	Excavation/Disturbance ⁽¹⁾	Height of New Electric Lines ⁽²⁾	Area and Depth of Disturbance per pole/structure ⁽³⁾	Equipment	Length of Time to Conduct Activity	Frequency of Activities ⁽⁴⁾
Line Upgrade/Rebuilds	Rebuilds of existing electric line involve removing old structures/poles and replacing with new conductor.	Excavation/disturbance is the same as new overhead transmission/distribution line construction above.	Height is the same as for distribution/ transmission lines above.	Area and depth are the same as for distribution/ transmission lines above.	Bulldozers, cranes, lift trucks, pickups, trucks of various sizes, dump trucks, tractors, four-wheelers, wire carts, and tensioners	6 miles per month	For the past 5 years, approximately 70 miles of lines have been rebuilt on an annual basis. Over the next 5 years it is projected that an average of about 165 miles will be rebuilt annually.
Insulator Replacement	Activity involves taking existing electric line out of service, removing old insulators (long cylindrical, nonconductive device made of porcelain that separates the energized conductor) from structures and installing new insulators, installation of safety grounds, and putting line back in service.	The only potential disturbance for this activity is equipment access up and down ROW.	NA	NA	Pickup trucks, lift trucks, and boom trucks	345-kV Transmission Line: 1 day per insulator 138-kV Transmission Line: 1/2 day per insulator Distribution: 1 insulator per 10 minutes energized and 3 insulators per 10 minutes de-energized	Insulator replacements are a very rare occurrence. Typically, insulators are designed to last 50 to 60 years. Replacements are due to degradation of the insulator over time, lightning strike, or wildlife damage.
Underground Electric Maintenance	Typically includes replacement of electrical equipment including wire or cable installed on the ground or subsurface.	ROW vegetation clearing and excavation to access electrical equipment.	NA	NA	Backhoes, shovels, pickup trucks, etc.	Dependent on many factors including how many leaks and/or faults occur are on a particular line, where they are located (open land vs. underneath roads, etc.).	Transmission: Over the last 11 years only 9 leak repairs and/or fault locates took place on underground transmission lines. Distribution: Systemwide approx. 150 buried cable fault locates occur per month.

¹ Excavation and area of disturbance can vary due to site-specific conditions such as weather (wet vs. dry conditions), soil type, terrain, and urban vs. rural locations.

*Note: Staging areas are not included as potential disturbances. Generally, equipment and supplies are stored within existing substation yards or an existing yard will be rented for the duration of the project

² Height of structure dependent on clearances needed for traffic, terrain, and/or waterbody crossings.

³ Structure/pole depth is dependent on height of the structure/pole itself and soil conditions. Depths given here are based on average soil conditions. In addition, the number of poles/structures per mile is dependent on type of structure/pole used, soil conditions and terrain.

⁴ Numerous factors are considered to determine when an entire overhead distribution circuit needs vegetation clearing or trimming such as safety concerns, inspections, outages, storm damage, circuit performance, and reliability. Distribution feeder performance data (e.g., outage restoration data), reliability indices, and visual information are gathered, monitored, and analyzed on an ongoing basis to assess impact of vegetation and determine appropriate amount, location, and timing of vegetation management for each feeder.

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- **Surveying** – Includes rights-of-way centerline and support facility surveys prior to construction. Typically involves hand clearing of vegetation and placement of stakes along site boundaries.

Activities associated with maintenance of facilities include:

- **Vegetation management** – Includes maintaining rights-of-way via tree trimming/topping or removal and/or mowing and weed control around the perimeter of substations and switching stations.
- **Expansion of existing support facilities** – Typically occurs at substations and switching sites to facilitate load increases. Involves installation of additional electrical equipment and may result in expansion of the substation site boundaries (clearing and placement of base material).
- **Line upgrade-reconductoring** – Typically involves replacing old wires with new wires on existing transmission/distribution structures, which requires equipment access within the rights-of-way.
- **Line upgrade-rebuilds** – Typically involves removal of old transmission/distribution structures and replacement with new structures and new wire. Includes rights-of-way vegetation clearing, excavating, and pouring structure foundations, assembling and setting support structures, installing hardware on support structures, installing new lines, and final cleanup.
- **Insulator replacement** – Involves removal of existing insulators on transmission/ distribution line structures and new insulator installation. Requires equipment access within the rights-of-way.
- **Maintenance of underground electric facilities** – Typically includes replacement of electrical equipment, including wire or cable installed on the ground or subsurface. Maintenance includes rights-of-way vegetation clearing and excavation to access electrical equipment.

Activities associated with new construction include the following:

- **Construction of new overhead transmission and distribution lines** – Typically includes rights-of-way clearing, excavating, and pouring structure foundations, assembling and setting support structures, installing hardware on support structures, installing new lines, and final cleanup. Equipment staging areas occur within cleared rights-of-way or are rented spaces that are typically used as parking areas.
- **Installation of new underground electric lines** – Typically installed in metropolitan areas, residential subdivisions, airports, and commercial developments. Activities include removal of vegetation from rights-of-way, trenching and/or boring/directional drilling, installing pipe, installing cable/conductors, splicing cable, terminating cable, filling with dielectric fluid, installing cathodic protection, and energizing.
- **Construction of new support facilities** – Involves vegetation clearing (if necessary), site grading, spreading, and compaction of base material, drilling of foundations, and installation of electrical equipment.
- **Upgrade facilities within existing rights-of-way** – Typically involves installation of new wire on one side of existing double-circuit structures. Activities include equipment access within

rights-of-way and clearing rights-of-way on side where new wire is installed, if not already cleared.

5.0 POTENTIAL BIOLOGICAL IMPACTS AND ASSESSMENT OF TAKE

5.1 INTRODUCTION

The Applicant's Preferred Alternative (Alternative 2: Proposed HCP) has been evaluated for potential effects on covered species and other species of special interest described in sections 3.2 and 3.3, respectively. For each species, effects are identified as being either direct or indirect. Under these types, the effects could be either beneficial or adverse. These terms are defined below:

- *Direct Impact:* An effect that is caused by an action and occurs in the same time and place.
- *Indirect Impact:* An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.
- *Beneficial Impact:* A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
- *Adverse Impact:* A change that moves the resource away from a desired condition or detracts from its appearance or condition.

For the covered species and other species of special interest, the discussion of potential impacts is preceded by definition of the context and level of impact for that particular resource. The context is described generally and expanded upon in the following discussion of impacts for that species. The level of an impact is expressed as negligible, minor, moderate, or major. Following the analyses of direct and indirect impacts for each covered species, this chapter presents an assessment of requested take under the proposed HCP and section 10(a)(1)(b) incidental take permit. Direct and indirect impacts to other species of special interest are presented by taxonomic group due to the intragroup similarity of anticipated impacts from covered activities. No take is anticipated for other species of special interest and as such will not be requested under the section 10(a)(1)(b) permit. This chapter concludes with an assessment of cumulative impacts to covered species expected under covered activities,

5.1.1 Assumptions Underlying the Impact Analysis

The proposed HCP would provide a means of compliance with the ESA for the Applicant that would expedite the ESA compliance process. The Applicant will have the ability to complete the covered activities and remain in compliance with the ESA through an alternative, streamlined process other than individual consultations with the Service (i.e., through ESA section 10 or section 7 formal or informal consultations). Without approval of this HCP and issuance of a comprehensive section 10(a)(1)(b) incidental take permit, ESA compliance would still be completed on a project-by-project basis. Mitigation would also be determined on a project-by-project basis. Not all activities, however, would result in the necessity of a take permit, or even informal consultation with the Service. Issuance of the requested incidental take permit, therefore, is not a prerequisite or a catalyst for the covered activities, as the covered activities are driven by the need for reliable power. Failure to implement the HCP would not

impede those activities because alternative means of ESA compliance are available, and the need for the activities would not change.

It must be noted, however, that this HCP provides a comprehensive, multi-species evaluation of the entire proposed Permit Area and the effects of the covered activities on relevant species. If this HCP was not approved, the Applicant would continue with the project-by-project, small-scale impact assessment and conservation approach, and ESA compliance would occur for each isolated project area within the proposed Permit Area where such actions may affect federally listed species. Additionally, for projects that avoid impact to protected species, no ESA consultation would be required. Under this scenario, the proposed Permit Area would not be evaluated in a comprehensive manner. Thus, this HCP provides a detailed biological evaluation of relevant impacts for the Applicant's Preferred Alternative throughout the proposed Permit Area, where the listed species of concern exist. Although this does not relieve the Applicant from compiling necessary environmental impact assessments at the time they initiate a project, it does provide assurance that the HCP is implemented with a full understanding of the possible impact scenarios, and this HCP will serve as a valuable reference point for covered activities.

5.1.2 Assumptions in Assessment of Take

As noted earlier, take, as defined in section 3 of the ESA, is to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any of these activities. Harm has been further defined to include significant habitat modification or degradation where such action actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. As described in the Service's 1996 HCP handbook, take can be measured in terms of the number of individuals affected or by the area of habitat affected, where it is generally assumed that all individuals occupying that habitat are taken. Since the precise number of any of the covered species to be taken by the covered activities is not known, the Applicant proposes to measure take in terms of the area of covered species habitat affected by the covered activities, to the extent that the effects constitute take.

Even though the Applicant will implement every practical means to avoid take, it is believed that unavoidable habitat modifications will sometimes result in incidental take. This analysis addresses direct and indirect impacts to habitat. While some presence/absence data do exist, much of this analysis is based on an assumption of covered species presence. Considering the proposed 30-year term of the permit in relation to the somewhat dynamic nature of habitat boundaries, it seems logical to base this analysis on assumed presence with follow-up analysis at the time a covered activity is conducted. Depending on the timing of the covered activity, the Applicant may conduct presence/absence surveys as a means to validate the presence assumption and thus the need for compensatory mitigation. In some cases, such as emergency response or removal of danger trees, presence/absence surveys will not be possible. In others, such as conflicts between survey protocol timing/extent and project schedule, presence/absence surveys may not be practical.

The Applicant has projected an acreage of potential and/or occupied habitat that may be impacted as a result of the covered activities. These estimates, which are presented in this section, reflect the maximum allowable take under the requested permit. The Applicant is applying for the maximum potential incidental take of habitat. However, given avoidance, minimization, and conservation measures and BMPs, the actualized extent of this incidental take is likely to be less than estimated, especially considering the liberal reliance on presumed presence to assure full assessment of potential take for each species. The impact acreage estimates involved extensive research to gather data relating to mileage and rights-of-way acreage for existing linear facilities within the Applicant's proposed Permit Area, along with projections of future maintenance/replacement of these facilities. Locations of existing facilities were compared to the Service county listings for each covered species by utilizing the Applicant's knowledge of known potential habitat locations in relation to existing facilities. Additionally, values include a growth reserve contingency to account for unidentified new construction of linear and nonlinear facilities.

Potential habitat impact acreages are broken down by operation/maintenance impacts of existing facilities and by new construction impacts associated with electric transmission facilities. These impacts are presented as maximum values and account for contingencies such as higher-than-estimated habitat acreage, expanding covered species populations (i.e., recovery) over the 30-year life of the proposed permit, higher-than-predicted human population or industrial growth rates, future acquisition of existing facilities from other companies, and impacts associated with operating or constructing electric distribution facilities.

Estimates of the acreage of potential habitat impacted are based on typical specifications for a 345-kV electric transmission line facility. Such facilities typically have a rights-of-way width of 160 feet (49 meters). The Applicant believes that this basis results in a conservative estimate because rights-of-way widths for its electric transmission system range from 70 to 160 feet (21 to 49 meters) depending on voltage rating, support structure design, and vegetation characteristics. The Applicant also believes that the estimate is conservative enough to include impacts from distribution line and support structure acreage and to account for staging areas, access roads, and other areas required for completion of covered activities. Rights-of-way mileage was estimated via electronic measurement of facility computer aided design drawings. For plant species, if an associated soil series and vegetation community occurs in a facility's rights-of-way and current land use is appropriate, the Applicant assumes presence unless recent surveys have indicated otherwise.

Potential habitat acreage estimates are also based in part on ecological pedestrian habitat assessments performed in the field for over 2,200 miles (3,540 kilometers) of the Applicant's facility rights-of-way spanning all ecological regions within the proposed Permit Area. These ongoing on-the-ground pedestrian habitat assessments began in 1999 and have been conducted in support of utility line construction and maintenance activities. Additionally, in regions where few or no pedestrian habitat assessments have been conducted, the Applicant's environmental personnel have conducted

representative vehicle reconnaissance where existing rights-of-way intersects or parallels major highways and roads.

It should be noted that, since construction of new facilities would be largely dependent on future demand, the Applicant cannot at this time accurately determine the future location of covered activities within the proposed Permit Area. An estimated 3,000 miles (4,827 kilometers) of new electric transmission lines and 106,000 miles (170,554 kilometers) of new distribution lines will be constructed during the 30-year life of the permit. As much as 1,200 miles (1,931 kilometers) of these new lines could cross potential habitat for the 11 covered species. The expected take of any of the covered species as a result of the preferred alternative will not reduce the potential for survival and recovery of these species in the wild, as mandated by requirements of 50 CFR Part 17.22(b)(1)(iii). Justification for each species is provided in the following subsections.

5.2 COVERED SPECIES

Eleven federally listed species would be covered by the incidental take permit being requested under the Applicant's Preferred Alternative. Indicators of impact vary by species. Definitions of level of impact, however, are similar for all covered species and are as follows:

- No Effect: Covered species would not be affected.
- May affect, but not likely to adversely affect (Negligible): Effects are discountable, insignificant, or completely beneficial. Effects to covered species would be so small as not to be of any measurable or perceptible consequence to the population in the proposed Permit Area.
- May affect, likely to adversely affect – effects may rise to the level of take (Minor): A measurable effect on the covered species or their habitats would occur, but the change would be small and relatively localized within the proposed Permit Area.
- Adverse effects – effects rise to the level of take (Moderate): A noticeable effect to the population of the covered species would occur. The effect would be of consequence to populations or habitats within the proposed Permit Area.
- Adverse effects (Major): A noticeable effect with severe consequences or exceptional benefit to populations or habitats of the covered species within the proposed Permit Area would occur.

While take of listed plants is not prohibited under section 9 of the ESA, no Federal action, including issuance of this permit, can jeopardize the continuing existence of any listed species, including plants. In order to include the large-fruited sand-verbena, Texas poppy-mallow, Navasota ladies'-tresses, and Pecos sunflower and avoid jeopardy to these species, specific actions as discussed throughout will be taken.

The following subsections provide a description of potential impacts associated with covered activities that are anticipated to affect each covered species within the proposed Permit Area. An evaluation of the amount of incidental take likely to occur from covered activities and requested for each covered species under the section 10(a)(1)(b) permit follows.

5.2.1 Large-fruited Sand-Verbena

Impacts to the large-fruited sand-verbena from covered activities would be considered not adverse or adverse, as defined, if they were to result in one or more of the following:

- The existing primary threats to the habitat used by the species would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
- The size of the large-fruited sand-verbena population in the proposed Permit Area would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).
- The recovery tasks or actions of the large-fruited sand-verbena recovery plan were furthered or achieved (beneficial effects – no adverse effects) or were precluded from being implemented or achieved (adverse effects).

5.2.1.1 Direct Impacts

Potential direct impacts to the large-fruited sand-verbena during construction and maintenance activities (covered activities) include mortality or damage to individual plants within the rights-of-way through crushing via vehicular and pedestrian traffic; mortality or damage through mowing; and mortality as a result of herbicide use to clear and maintain the rights-of-way. The Applicant will minimize herbicide use within rights-of-way, especially within potential habitat. However, should herbicides be used in such areas, the Applicant's employees or contractors will use only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) to avoid or minimize adverse direct impacts to the large-fruited sand-verbena. Because of the avoidance and minimization measures and BMPs, the proposed construction and maintenance activities would minimize impacts to the large-fruited sand-verbena. Such measures include, but are not limited to, surveying the rights-of-way for these plants during their blooming period prior to clearing and construction activities; fencing any individual or populations encountered, spanning known occupied or potential habitat for the plant, and, in the case of new transmission lines, possibly rerouting the line. Potential adverse impacts to the large-fruited sand-verbena resulting from covered activities are expected to be minor to moderate. However, it should be noted that the Applicant believes adverse direct impacts from new construction can be avoided using avoidance, minimization, and conservation measures briefly mentioned herein and further described under the Conservation Program (Section 6).

5.2.1.2 Indirect Impacts

No significant adverse or beneficial indirect impacts from covered activities are anticipated for the large-fruited sand-verbena. This species is restricted to sparsely vegetated openings in sugar sands or blowout sands, where little to no vegetation clearing of the rights-of-way would occur in any case, and the habitat would remain relatively undisturbed by covered activities. Therefore, the introduction of invasive or exotic species, such as bermudagrass or King Ranch bluestem (*Bothriochloa ischaemum*), into suitable

sand-verbena habitat, within or adjacent to the rights-of-way, where these species could spread and successfully outcompete the large-fruited sand-verbena or lead to degradation of habitat is highly unlikely.

Adherence to the avoidance, minimization, and conservation measures, and BMPs, established in the Conservation Program (Section 6) of this document, would prevent, or appreciably reduce so as to have no adverse indirect impacts to the large-fruited sand-verbena from covered activities. Specific actions to preclude indirect impacts to this species from covered activities include, but are not limited to, assessing habitat potential and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; constructing new facilities, where possible, adjacent to existing maintained rights-of-way; minimizing soil disturbance caused by covered activities; complying with the stormwater BMPs to prevent indirect impacts from sedimentation, erosion, contamination, and pollution; minimizing herbicide use for vegetation control, to the maximum extent practicable, and using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence); and revegetating areas disturbed by covered activities with native species when appropriate to ensure invasive plant species do not colonize, establish, and then spread to adjacent habitats where they could outcompete, displace, and extirpate this species. It must be noted that when revegetating rights-of-way in general, the Applicant follows the landowners' wishes. When the landowner has no preference, the Applicant revegetates the rights-of-way with native species. Revegetation species may also depend on the season. For example, ryegrass may be planted in cool weather to help stabilize the rights-of-way and to reduce runoff. This species would not be planted in the summer because it would be too hot. Potential adverse indirect impacts to the large-fruited sand-verbena resulting from covered activities are expected to be negligible.

5.2.1.3 Assessment of Take

5.2.1.3.1 Existing Facilities

The large-fruited sand-verbena currently occurs in Freestone, Leon, and Robertson counties within the proposed Permit Area. The Applicant has 288 miles (463 kilometers) totaling 5,585 acres (2,260 hectares) of rights-of-way of existing electric transmission facilities in these three counties: 151 miles (243 kilometers) or 2,928 acres (1,185 hectares) in Freestone County, 121 miles (195 kilometers) or 2,347 acres (950 hectares) in Leon County, and 16 miles (26 kilometers) or 310 acres (126 hectares) in Robertson County (Table 5-1).

The Applicant has conducted on-the-ground pedestrian habitat assessments for the large-fruited sand-verbena on about 40 percent of the electric transmission rights-of-way in Leon County and 50 percent of the electric transmission rights-of-way in Robertson County. No occurrences or suitable potential habitat have been observed. Based on this experience and a review of the soil surveys for Freestone (Soil Conservation Service 2002a) and Leon (Soil Conservation Service 1989) counties, and aerial photography

(Texas Natural Resources Information System 2004) and electronic soil data (Natural Resources Conservation Service 2004) for Robertson County (no published soil survey is available for this county), the Applicant has concluded that less than 1 percent (0.01 to 0.1 percent) of its existing rights-of-way for electric facilities contain suitable potential habitat. For the purposes of this analysis, it is assumed that potential habitat covers, at most, 0.1 percent of the Applicant's existing electric facility rights-of-way. Therefore, the estimated maximum potential habitat associated with existing electric transmission line facilities that would be impacted by operation and maintenance activities of existing facilities is 5.5 acres (2.2 hectares): 2.9 acres (1.2 hectares) in Freestone County, 2.3 acres (0.9 hectare) in Leon County, and 0.3 acre (0.1 hectare) in Robertson County (see Table 5-1). Because of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and discussed further in Section 6 of this document, the Applicant believes that indirect impacts to the large-fruited sand-verbena from operation and maintenance of existing facilities will be avoided. Therefore, covered activities for existing facilities may affect and are likely to adversely affect large-fruited sand-verbena through direct impacts to at most 5.5 acres (2.2 hectares) of habitat under the proposed HCP.

Table 5-1. Acres (Hectares) of Potential Impact to the Large-Fruited Sand-Verbena

Facilities	County	Miles (Kilometers)		Rights-of-Way Acres		Acres (Hectares) of	
		of Facilities ¹		(Hectares) of Facilities ²		Potential Impact ³	
Existing	Freestone	151	(243)	2,928	(1,185)	2.9	(1.2)
	Leon	121	(195)	2,347	(950)	2.3	(0.9)
	Robertson	16	(26)	310	(126)	0.3	(0.1)
	Total	288	(463)	5,585	(2,261)	5.5	(2.2)

¹ Estimated total miles of facilities (electric transmission lines) within the distribution range of the large-fruited sand-verbena.

² Estimated total right-of-way acreage of facilities within the distribution range of the large-fruited sand-verbena based on 160-foot (49-meter)-wide rights-of-way.

³ Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

5.2.1.3.2 New Facilities

Because of the limited range and specialized habitat of the large-fruited sand-verbena, the Applicant intends that existing populations can be avoided when designing and constructing new electric facilities. Field habitat assessment surveys of the proposed rights-of-way in areas of potential habitat, such as deep sands of the Padina and Arenosa series, and dune habitat, will be conducted by the Applicant or its consultant to determine potential habitat prior to clearing and construction. Because the amount of take for existing facilities is overestimated, the Applicant believes that any take for new construction is accounted for.

If the project schedule allows, presence/absence surveys will be conducted in areas of potential habitat (see Section 6). Individual plants/populations encountered within the rights-of-way will be temporarily fenced off with chain-link fencing and avoided, where presence/absence surveys are conducted. Clearing

will be avoided or minimized to prevent impacts in these areas. Where potential habitat exists and presence/absence surveys are not conducted, the Applicant will assume presence, implement minimization measures and BMPs, and mitigate for unavoidable impacts or impacts will be precluded through avoidance measures, such as rerouting proposed transmission and distribution lines that would intersect or parallel potential habitat. Populations adjacent to the rights-of-way will be avoided. Because of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and discussed further in Section 6 of this document, the Applicant believes that direct and indirect impacts to the large-fruited sand-verbena from construction of new electric facilities will be avoided. Therefore, covered activities for new facilities are not likely to affect the large-fruited sand-verbena under the proposed HCP.

5.2.2 Texas Poppy-Mallow

Impacts to the Texas poppy-mallow from covered activities would be considered significant if they were to result in one or more of the following:

- The existing primary threats to the habitat used by the species would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
- The size of the Texas poppy-mallow population in the proposed Permit Area would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).
- The recovery tasks or actions of the Texas poppy-mallow recovery plan were furthered or achieved (beneficial effects – no adverse effects) or were precluded from being implemented or achieved (adverse effects).

5.2.2.1 Direct Impacts

Potential direct impacts on the Texas poppy-mallow from the proposed project activities are similar to those for the large-fruited sand-verbena, with potential adverse impacts ranging from minor to moderate. Potential adverse direct impacts include mortality or damage to individual plants within the rights-of-way through crushing via vehicular and pedestrian traffic; mortality or damage through mowing; and mortality as a result of using herbicides to clear and maintain the rights-of-way. Because of avoidance, minimization, and conservation measures and BMPs established by this HCP's Conservation Program (Section 6), such as surveying the rights-of-way for these plants during their blooming period prior to clearing and construction activities, fencing any individual or populations encountered, spanning known occupied and potential habitat, and, in the case of new transmission lines, possibly rerouting the line, the proposed covered activities would minimize direct adverse impacts to the Texas poppy-mallow.

5.2.2.2 Indirect Impacts

No significant indirect adverse or beneficial impacts from covered activities are anticipated for the Texas poppy-mallow. Alterations to the landscape, including disturbance of surface and subsurface soil horizons, use of nonnative soils as fill, or modification of natural drainages within rights-of-way, would

cause the most important adverse indirect impacts to the Texas poppy-mallow. Changes in soil composition, either by disturbing soil horizons or by importing soil, could potentially have indirect effects on this species by inhibiting seed germination and/or growth, introducing competitors, such as weedy or invasive plant species, or changing habitat suitability by altering edaphic conditions. Among the potential impacts resulting from alterations to surface hydrology, changes in the availability of moisture would have the most significant effect.

As noted earlier, clearing and revegetation of the rights-of-way could potentially lead to the introduction of invasive or exotic species into habitats within and adjacent to the rights-of-way. These introduced species could successfully compete with and displace the Texas poppy-mallow or reduce habitat suitability for this species through altering resource conditions. The Texas poppy-mallow, however, occurs in grasslands or open oak or mesquite woodlands, where little clearing of the rights-of-way would occur. Increased edge effects caused by habitat fragmentation from covered activities could facilitate growth in deer populations, which concomitantly could exacerbate browsing pressure on these plants.

Adherence to the avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document, would prevent, or appreciably reduce so as to have no adverse indirect impacts to the Texas poppy-mallow from covered activities. Specific actions to preclude indirect impacts to this species from covered activities include, but are not limited to, assessing habitat potential and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; constructing new facilities, where possible, adjacent to existing maintained rights-of-way; minimizing soil disturbance caused by covered activities and, where disturbance occurs, recontouring to original grade to reduce hydrologic impacts; minimizing mechanical means of clearing, such as mowing, until after the fruit has matured (July) where covered projects traverse or are adjacent to potential habitat; complying with stormwater BMPs to prevent indirect impacts from sedimentation, erosion, contamination, and pollution; minimizing herbicide use for vegetation control, to the maximum extent practicable, and using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence); and revegetating areas disturbed by covered activities with native species, when appropriate, to ensure invasive plant species do not colonize, establish, and then spread to adjacent occupied or suitable habitats where they could outcompete, displace, and extirpate this species. It must be noted that when revegetating rights-of-way in general, the Applicant follows the landowners' wishes. When the landowner has no preference, the Applicant revegetates the rights-of-way with native species. Revegetation species may also depend on the season. For example, ryegrass may be planted in cool weather to help stabilize the rights-of-way and to reduce runoff. This species would not be planted in the summer because it would be too hot. Potential adverse indirect impacts to the Texas poppy-mallow resulting from covered activities are expected to be negligible.

5.2.2.3 Assessment of Take

5.2.2.3.1 Existing Facilities

This species occurs only in three counties, Mitchell, Coke, and Runnels, all of which are within the proposed Permit Area. The Applicant currently has 221 miles (356 kilometers) or 4,286 acres (1,735 hectares) of existing electric facility rights-of-way in Mitchell County. This mileage, however, does not include the 2002 Morgan Creek-Comanche 345-kV transmission line. No habitat for this species was found in the rights-of-way for this project (PBS&J 2000a).

Since no published soil survey is available for Mitchell County (i.e., not published or out of print), estimates of potential habitat for the Texas poppy-mallow are based on a review of aerial photography (Texas Natural Resources Information System 2004) and electronic soil data (Natural Resources Conservation Service 2004). According to this information, about 3.3 miles (5.3 kilometers) or 1.5 percent of the Applicant's existing rights-of-way for electric facilities in Mitchell County cross soils associated with the Texas poppy-mallow. As such, the Applicant has concluded that potential habitat may cover, at most, 1.5 percent (64 acres or 26 hectares) of its existing electric facility rights-of-way in this county (Table 5-2). Because of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and discussed in the Conservation Program (Section 6) of this document, the Applicant believes that indirect impacts to the Texas poppy-mallow from operation and maintenance of existing facilities will be avoided. Therefore, covered activities for existing facilities may affect and are likely to adversely affect Texas poppy-mallow through direct impacts to at most 64 acres (26 hectares) of habitat under the proposed HCP.

Table 5-2. Acres (Hectares) of Potential Impact to the Texas Poppy-Mallow

Facilities	County	Miles (Kilometers) of Facilities ¹		Rights-of-Way Acres (Hectares) of Facilities ²		Acres (Hectares) of Potential Impact ³	
Existing	Coke	0	(0)	0	(0)	0	(0)
	Mitchell	221	(356)	4,286	(1,735)	64	(26)
	Runnels	0	(0)	0	(0)	0	(0)
Total		221	(356)	4,286	(1,735)	64	(26)

¹ Estimated total miles of facilities (electric transmission lines) within the distribution range of the Texas poppy-mallow.

² Estimated total right-of-way acreage of facilities within the distribution range of the Texas poppy-mallow based on 160-foot (49-meter)-wide rights-of-way.

³ Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

5.2.2.3.2 New Facilities

Because of the limited range and specialized habitat of the Texas poppy-mallow, the Applicant intends that existing populations can be avoided when designing and constructing new electric facilities. Consequently, no adverse or beneficial, direct or indirect impacts to Texas poppy-mallow will occur.

Field habitat assessment surveys of the proposed rights-of-way in areas of potential habitat, such as deep sands, especially Tivoli soils, along the current and historic Colorado River drainage will be conducted by the Applicant or its consultant to determine potential habitat prior to construction. Because the amount of take for existing facilities is overestimated, the Applicant believes that any take for new construction is accounted for.

If the project schedule allows, presence/absence surveys will be conducted in areas of potential habitat, as described in Section 6. Where presence/absence surveys are conducted, individual plants/populations encountered within the rights-of-way will be temporarily fenced off with chain-link fencing and avoided. Clearing will be avoided or minimized to prevent impacts in these areas. Where suitable habitat exists and presence/absence surveys are not conducted, the Applicant will assume presence, implement minimization measures and BMPs, and mitigate for unavoidable impacts or impacts will be prevented through avoidance measures, such as rerouting proposed transmission and distribution lines that would intersect or parallel potential habitat. Populations adjacent to the rights-of-way will be avoided. The Applicant believes that direct and indirect impacts to the Texas poppy-mallow from construction of new electric facilities will be avoided through implementation of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and discussed in the Conservation Program (Section 6) of this document. Therefore, covered activities for new facilities are not likely to affect the Texas poppy-mallow under the proposed HCP.

5.2.3 Navasota Ladies'-tresses

Impacts to the Navasota ladies'-tresses from covered activities would be considered significant if they were to result in one or more of the following:

- The existing primary threats to the habitat used by the species would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
- The size of the Navasota ladies'-tresses population in the proposed Permit Area would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).
- The recovery tasks or actions of the Navasota ladies'-tresses recovery plan were furthered or achieved (beneficial effects – no adverse effects) or were precluded from being implemented or achieved (adverse effects).

5.2.3.1 Direct Impacts

Similar to the large-fruited sand-verbena and Texas poppy-mallow, potential adverse direct impacts to Navasota ladies'-tresses during construction and maintenance activities include mortality or damage to individual plants through vehicular and pedestrian traffic; mortality or damage through mowing; and mortality as a result of herbicides. Because of avoidance, minimization, and conservation measures and BMPs, such as but not limited to, surveying the rights-of-way for these plants during their blooming period prior to clearing and construction activities, fencing any individual or populations encountered,

spanning known occupied or potential habitat, and, in the case of new transmission lines, possibly rerouting the line, impacts to the Navasota ladies'-tresses would be minimized. Overall, adverse direct impacts to the Navasota ladies'-tresses resulting from covered activities are expected to be minor to moderate.

5.2.3.2 Indirect Impacts

Potential adverse indirect impacts to Navasota ladies'-tresses from covered activities are similar to those for the Texas poppy-mallow and other covered plant species. Alterations to the landscape, including disturbance of surface and subsurface soil horizons, use of nonnative soils as fill, or modification of natural or preexisting drainages within rights-of-way, would cause the most important indirect impacts to the Navasota ladies'-tresses. Changes in soil composition, either by disturbing soil horizons or by importing soil, could indirectly affect this species by inhibiting seed germination and/or growth, introducing competitors, such as weedy or invasive plant species, or changing habitat suitability by altering resource conditions. Among the potential impacts resulting from alterations to surface hydrology, changes in the availability of moisture would have the most significant effect.

As noted earlier, clearing and revegetation of the rights-of-way could lead to the introduction of invasive or exotic species into habitats within and adjacent to the rights-of-way. These introduced species could colonize, establish and then spread into habitat occupied or suitable for Navasota ladies'-tresses and successfully outcompete extant species or alter resource availability so that habitat becomes less suitable or unsuitable for the species. Increased edge effects caused by habitat fragmentation from covered activities could facilitate growth in deer populations, which concomitantly could exacerbate browsing pressure on these plants.

Adherence to the avoidance, minimization, and conservation measures, and BMPs, established by the Conservation Program (Section 6) of this document, would minimize adverse indirect impacts to the Navasota ladies'-tresses from covered activities. Specific actions to reduce indirect impacts to this species from covered activities include, but are not limited to, assessing habitat potential and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; constructing new facilities, where possible, adjacent to existing maintained rights-of-way; minimizing soil disturbance caused by covered activities and, where disturbance occurs, recontouring to original grade to reduce hydrologic impacts; minimizing mechanical means of clearing within or near potential habitat during construction, such as mowing during the months of October and November, to reduce potential damage to flowering Navasota ladies'-tresses; complying with the stormwater BMPs to prevent indirect impacts from sedimentation, erosion, contamination, and pollution; minimizing herbicide use for vegetation control, to the maximum extent practicable, and using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence); and revegetating areas disturbed by covered activities with native

species, when appropriate, to ensure invasive plant species do not colonize, establish, and then spread into adjacent occupied or suitable habitats where they could outcompete, displace, and extirpate this species. It must be noted that when revegetating rights-of-way in general, the Applicant follows the landowners' wishes. When the landowner has no preference, the Applicant revegetates the rights-of-way with native species. Revegetation species may also depend on the season. For example, ryegrass may be planted in cool weather to help stabilize the rights-of-way and to reduce runoff. This species would not be planted in the summer because it would be too hot. Potential adverse indirect impacts to the Navasota ladies'-tresses resulting from covered activities are expected to be minor.

5.2.3.3 Assessment of Take

5.2.3.3.1 Existing Facilities

The Navasota ladies'-tresses currently occurs in Bastrop, Freestone, Leon, Limestone, Milam, and Robertson counties within the proposed Permit Area. The Applicant has 440 miles (708 kilometers) totaling 8,533 acres (3,455 hectares) of existing electric facility rights-of-way in these six counties: 9 miles (14 kilometers) or 175 acres (71 hectares) in Bastrop County, 151 miles (243 kilometers) or 2,928 acres (1,185 hectares) in Freestone County, 121 miles (195 kilometers) or 2,347 acres (950 hectares) in Leon County, 39 miles (63 kilometers) or 756 acres (306 hectares) in Limestone County, 104 miles (167 kilometers) or 2,017 acres (817 hectares) in Milam County, and 16 miles (26 kilometers) or 310 acres (126 hectares) in Robertson County (Table 5-3).

Table 5-3. Acres (Hectares) of Potential Impact to the Navasota Ladies'-Tresses

Facilities	County	Miles		Right-of-Way Acres		Acres (Hectares) of	
		(Kilometers) ¹	of Facilities ¹	(Hectares) ²	of Facilities ²	of Potential Impact ³	
Existing	Bastrop	9	(14)	175	(71)	4	(2)
	Freestone	151	(243)	2,928	(1,185)	293	(119)
	Leon	121	(195)	2,347	(950)	235	(95)
	Limestone	39	(63)	756	(306)	76	(31)
	Milam	104	(167)	2,017	(817)	202	(82)
	Robertson	16	(26)	310	(126)	31	(13)
	Total Existing		440	(708)	8,533	(3,455)	841
Future	Direct	50	(80)	970	(393)	97	(39)
	Indirect	50	(80)	970	(393)	5	(2)
	Total Future	100	(160)	1,940	(786)	102	(41)
	Total	490	(788)	9,503	(3,847)	943	(382)

¹ Estimated total miles of facilities (electric transmission lines) within the distribution range of the Navasota ladies'-tresses.

² Estimated total right-of-way acreage of facilities within the distribution range of the Navasota ladies'-tresses based on 160-foot (49-meter)-wide rights-of-way.

³ Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

General Note: Numbers rounded.

Field-based on-the-ground habitat assessments conducted by qualified biologists for the construction of new electric facilities by the Applicant in Freestone County determined that approximately 6.5 percent of the new rights-of-way possessed potential habitat for Navasota ladies'-tresses (PBS&J 2000b). Specifically, 27.2 acres (11 hectares) of potential habitat was identified on 22 miles (35 kilometers) or 427 acres (173 hectares) of rights-of-way. In addition, on-the-ground pedestrian habitat assessments conducted on about 40 percent of the existing electric transmission rights-of-way in Leon County, 20 percent in Madison County, 65 percent in Milam County, and 50 percent in Robertson County indicated similar percentages of potential habitat to those encountered in Freestone County. While no field-based surveys have been conducted in Limestone County, the Applicant's facilities in this county are near the Freestone county line; therefore, similar percentages of potential habitat to those encountered in Freestone County are expected.

Based on these habitat assessments and a review of the soil surveys for Freestone County (Soil Conservation Service 2002a) and Leon County (Soil Conservation Service 1989), the Applicant assumes the maximum impact to Navasota ladies'-tresses habitat to be 10 percent of its rights-of-way for these five counties. Through review of the soil survey for Bastrop County (Soil Conservation Service 1979), the Applicant believes that about 6 miles, or 66 percent, of its rights-of-way crosses soil conducive to Navasota ladies'-tresses. Aerial photography, however, indicates that most of this area is under cultivation with very little forested margin. As such, the Applicant has concluded that potential habitat covers, at most, 2 percent of its existing rights-of-way in this county. Thus, the Applicant estimates that at most 841 acres (340 hectares) of Navasota ladies'-tresses habitat may be impacted over the 30-year life of the permit: 4 acres (2 hectares) in Bastrop County, 293 acres (119 hectares) in Freestone County, 235 acres (95 hectares) in Leon County, 76 acres (31 hectares) in Limestone County, 202 acres (82 hectares) in Milam County, and 31 acres (13 hectares) in Robertson County (see Table 5-3). Because of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and discussed in the Conservation Program (Section 6) of this document, the Applicant believes that indirect impacts to the Navasota ladies'-tresses from operation and maintenance of existing facilities will be avoided. Therefore, covered activities for existing facilities may affect and are likely to adversely affect Navasota ladies'-tresses through direct impacts to at most 841 acres (340 hectares) of habitat under the proposed HCP.

5.2.3.3.2 New Facilities

Whereas impacts are not anticipated to other covered plant species by construction of new facilities, direct and indirect impacts to the Navasota ladies'-tresses are expected from such activities. Anticipation of impacts is based on the high occurrence of potentially suitable habitat for existing facilities and the distribution of the species in relation to likely locations for new facilities within its range. The Applicant estimates that 50 miles (80 kilometers) or 970 acres (393 hectares) of new electric facilities will be constructed in Bastrop, Freestone, Leon, Milam, and Robertson counties. Based on the assumed maximum impact to Navasota ladies'-tresses habitat of 10 percent for existing rights-of-way noted above, the Applicant assumes an equivalent maximum impact (10 percent) of its rights-of-way, or 97 acres

(39 hectares), for new facilities. Field habitat assessment surveys of the proposed rights-of-way in areas of potential habitat, such as sandy loam soils and intermittent drainages, will be conducted by the Applicant or its consultant to determine potential habitat prior to construction or clearing. If the project schedule allows, presence/absence surveys will be conducted in areas of potential habitat, as described in Section 6. Where presence/absence surveys are conducted, individual plants/populations encountered within the rights-of-way will be temporarily fenced off with chain-link fencing and avoided. Clearing will be avoided or minimized to prevent impacts in these areas. Where suitable habitat exists and presence/absence surveys are not conducted, the Applicant will assume presence, implement minimization measures and BMPs, and mitigate for unavoidable impacts or impacts will be prevented through avoidance measures, such as rerouting proposed transmission and distribution lines that would intersect or parallel potential habitat. Populations adjacent to the rights-of-way will be avoided.

The Applicant believes that 5 percent of potential habitat can be added to allow for potential indirect effects of newly constructed rights-of-way. Thus, at most 5 acres (2 hectares) of potential habitat may be indirectly impacted as a result of constructing new facilities (see Table 5-3). Anticipation of indirect impacts to Navasota ladies'-tresses and not other covered plant species is based on the high occurrence of potential habitat for existing facilities and the distribution of the species within the potential Permit Area, as previously stated. Because of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this document, the Applicant believes that direct and indirect impacts to the Navasota ladies'-tresses from construction of new electric facilities will be minimized. Therefore, covered activities for new facilities may affect and are likely to adversely affect Navasota ladies'-tresses through impacts to at most 102 acres (41 hectares) of habitat under the proposed HCP.

5.2.4 Pecos Sunflower

Impacts to the Pecos sunflower from covered activities would be considered significant if they were to result in one or more of the following:

- The existing primary threats to the habitat used by the species would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
- The size of the Pecos sunflower population in the proposed Permit Area would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).
- The recovery tasks or actions of the Pecos sunflower recovery plan were furthered or achieved (beneficial effects – no adverse effects) or were precluded from being implemented or achieved (adverse effects).

5.2.4.1 Direct Impacts

Potential direct impacts to the Pecos sunflower during construction and maintenance activities are similar to those for the other three covered plant species. Adverse impacts include mortality/damage to individual plants via vehicular/pedestrian traffic and mowing, and mortality to individuals and

populations as a result of herbicides. Because of the avoidance and minimization measures and BMPs described in the Conservation Program (Section 6) of this document, such as surveying the rights-of-way for these plants during their blooming period prior to clearing and construction activities, fencing any individual or populations encountered, spanning the plants, and, in the case of new transmission lines, possibly rerouting the line, the proposed construction and maintenance activities would minimize impacts to the Pecos sunflower. Compliance with Clean Water Act section 404 regulations would afford further protection, where applicable, to the wetland habitats this species inhabits. Overall, adverse direct impacts related to the covered activities would be minor to moderate.

5.2.4.2 Indirect Impacts

No significant adverse or beneficial indirect impacts from covered activities are anticipated for the Pecos sunflower. This species is found in spring-fed desert wetlands or cienegas. Such habitat can be avoided or spanned, with very little right-of-way disturbance. Therefore, the risk of introduction of invasive or exotic species into adjacent habitats that could successfully compete with the Pecos sunflower or alter resource availability so as to degrade habitat suitability for this species is very low.

Adherence to the avoidance, minimization, and conservation measures and BMPs, established by the Conservation Program (Section 6) of this document, would prevent, or appreciably reduce so as to have no adverse indirect impacts to the Pecos sunflower from covered activities. Specific actions to preclude indirect impacts to this species from covered activities include, but are not limited to, assessing habitat potential and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; constructing new facilities, where possible, adjacent to existing maintained rights-of-way; minimizing soil disturbance caused by covered activities and, where soil disturbance occurs in potential habitat, doing so when the plant species is dormant, recontouring to original grade to reduce hydrologic impacts, and using native soils for backfill to preserve edaphic conditions (e.g., soil salinity), when possible; complying with the stormwater BMPs to prevent indirect impacts from sedimentation, erosion, contamination, and pollution; minimizing herbicide use for vegetation control, to the maximum extent practicable, and using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence); and revegetating areas disturbed by covered activities with native species, when appropriate, to ensure invasive plant species do not colonize, establish, and then spread to adjacent habitats where they could outcompete, displace, and extirpate this species. It must be noted that when revegetating rights-of-way in general, the Applicant follows the landowners' wishes. When the landowner has no preference, the Applicant revegetates the rights-of-way with native species. Revegetation species may also depend on the season. For example, ryegrass may be planted in cool weather to help stabilize the rights-of-way and to reduce runoff. This species would not be planted in the summer because it would be too hot. Potential adverse indirect impacts to the Pecos sunflower resulting from covered activities are expected to be negligible.

5.2.4.3 Assessment of Take

5.2.4.3.1 Existing Facilities

The Pecos sunflower currently occurs in Pecos and Reeves counties, both of which are within the proposed Permit Area. The Applicant has 46 miles (74 kilometers) totaling 893 acres (362 hectares) of existing electric facility rights-of-way in these two counties: 32 miles (51 kilometers) or 621 acres (251 hectares) in Pecos County and 14 miles (23 kilometers) or 272 acres (110 hectares) in Reeves County (Table 5-4).

Based on a review of the soil surveys for Pecos (Soil Conservation Service 1980a) and Reeves (Soil Conservation Service 1980b) counties, as well as U.S. Geological Survey 7.5-minute topographic maps to estimate the potential for crossing open water or wetlands, the Applicant has concluded that potential habitat may cover between 0.1 and 1 percent of its existing rights-of-way for electric facilities. Therefore, the estimated maximum potential habitat associated with existing electric transmission line facilities that would be impacted by operation and maintenance activities of existing facilities is 9 acres (3.6 hectares): 6 acres (2.4 hectares) in Pecos County and 3 acres (1.2 acres) in Reeves County. Because of general and species-specific avoidance, minimization and conservation measures, and BMPs referenced above and established in the Conservation Program (Section 6) of this document, the Applicant believes that indirect impacts to the Pecos sunflower from operation and maintenance of existing facilities will be avoided. Therefore, covered activities for existing facilities may affect and are likely to adversely affect the Pecos sunflower through direct impacts to at most 9 acres (3.6 hectares) of habitat under the proposed HCP.

Table 5-4. Acres (Hectares) of Potential Impact to the Pecos Sunflower

Facilities	County	Miles (Kilometers) of Facilities ¹		Rights-of-Way Acres (Hectares) of Facilities ²		Acres (Hectares) of Potential Impact ³	
Existing	Pecos	32	(51)	621	(251)	6	(2.4)
	Reeves	14	(23)	272	(110)	3	(1.2)
	Total	46	(74)	893	(362)	9	(3.6)

¹ Estimated total miles of facilities (electric transmission lines) within the distribution range of the Pecos sunflower.

² Estimated total right-of-way acreage of facilities within the distribution range of the Pecos sunflower based on 160-foot (49-meter)-wide rights-of-way.

³ Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

5.2.4.3.2 New Facilities

Because of the limited and specialized habitat of the Pecos sunflower, the Applicant intends that existing populations can be avoided when designing and constructing new electric facilities. Field habitat assessment surveys of the proposed rights-of-way in areas of potential habitat, such as springs, seeps, and areas of deep, hydric loam soils, will be conducted by the Applicant or its consultant to determine potential habitat prior to clearing or construction. Because the amount of take for existing facilities is overestimated, the Applicant believes that any take for new construction is accounted for.

If the project schedule allows, presence/absence surveys will be conducted in areas of potential habitat, as described in Section 6. Individual plants/populations encountered within the rights-of-way will be temporarily fenced off with chain-link fencing and avoided, where presence/absence surveys are conducted. Clearing will be avoided or minimized to prevent impacts in these areas. Where suitable habitat exists and presence/absence surveys are not conducted, the Applicant will assume presence, implement minimization measures and BMPs, and mitigate for unavoidable impacts or impacts will be prevented through avoidance measures, such as rerouting proposed transmission and distribution lines that would intersect or parallel potential habitat. Populations adjacent to the rights-of-way will be avoided. The Applicant believes that direct and indirect impacts to the Pecos sunflower from construction of new electric facilities will be avoided through implementation of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and discussed in the Conservation Program (Section 6) of this document. Therefore, covered activities for new facilities are not likely to affect the Pecos sunflower under the proposed HCP.

5.2.4.3.3 Critical Habitat

Critical habitat for the Pecos sunflower in the proposed Permit Area includes 240 acres (97 hectares) of land in Pecos County approximately 12 miles (20 kilometers) north-northwest of Fort Stockton, Texas. This unit is located mostly within the 3,962-acre (1,603-hectare) Diamond Y Spring Preserve managed by The Nature Conservancy of Texas, but includes a portion of private land adjacent to the preserve. In Pecos County, no existing electric facilities are located within or adjacent to this critical habitat, and no new electric facilities will be built therein or adjacent thereto. No direct or indirect impacts to critical habitat for this species will occur from the covered activities. As such, impacts from covered activities proposed under this HCP will not result in the adverse modification of designated critical habitat for the Pecos sunflower.

5.2.5 American Burying Beetle

Impacts to the American burying beetle from covered activities would be considered significant if they were to result in one or more of the following:

- The existing primary threats to the habitat used by the species would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
- The size of the American burying beetle population in the proposed Permit Area would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).
- The recovery tasks or actions of the American burying beetle recovery plan were furthered or achieved (beneficial effects – no adverse effects) or were precluded from being implemented or achieved (adverse effects).

5.2.5.1 Direct Impacts

Potential adverse direct impacts to the American burying beetle include mortality during construction/maintenance activities and destruction/modification of habitat during construction of new facilities. Excavation required for covered activities in suitable habitat could result in the separation of adult American burying beetles from their larvae or eggs or direct crushing of individuals, dependent on the timing of activities. Potential adverse direct impacts related to soil compaction would also depend on the timing of activities. Activities causing soil compaction during the reproductive season could result in the destruction of brood chambers and render the soil unsuitable for carcass burial. In the inactive season, soil compaction could prohibit re-emergence of American burying beetles in the late spring or early summer. Because this species is winged and moderately mobile, it may avoid some impacts from the construction and maintenance activities. Pesticide application and accidental leaks or spills during construction and maintenance could result in impacts to this beetle, such as soil contamination that directly kills individuals or broods or displaces American burying beetles to less suitable habitat. Overall, adverse direct impacts to the American burying beetle resulting from covered activities are expected to be negligible to minor.

Adherence to the avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document, would minimize potential direct impacts to this species from covered activities. Specific actions to minimize direct impacts to this species from covered activities include, but are not limited to, avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; assessing habitat potential, occupancy, and/or likelihood therein on a project-by-project basis and through continued coordination with the Service; minimizing soil disturbance by covered activities and, where disturbance occurs, recontouring to original grade and using native soils for backfill to preserve edaphic conditions (e.g., soil porosity, texture, and moisture regime), when possible; minimizing pesticides application, especially in potentially occupied habitat, when practicable, and where impracticable, following regional Service guidelines to minimize potential impacts (Service 2004e).

5.2.5.2 Indirect Impacts

No significant adverse or beneficial indirect impacts from covered activities are anticipated for the American burying beetle. Potential indirect impacts would include soil compaction within the rights-of-way that might, if severe enough, prevent the beetles from carcass burial in the reasonably foreseeable future, although it is unlikely that all of the rights-of-way would be impacted to such a degree. Clearing and revegetation of the rights-of-way could lead to the introduction of invasive or exotic species into adjacent habitats that could outcompete or otherwise render the habitat unsuitable for the beetle. Changes in soil composition, either by disturbing soil horizons or by importing soil, could indirectly affect this species by importing diseases or pests such as the imported red fire ant. Fire ants are voracious predators and evidence exists that overall arthropod diversity drops in their presence (Porter and Savignano 1990, Vinson and Sorenson 1986). An increase in edge habitat may lead to an increase in predators/scavengers

such as the American crow, northern raccoon, foxes, and skunks, which compete with the American burying beetle for available carrion (Service 1991a).

Adherence to the avoidance, minimization, and conservation measures and BMPs, established by the Conservation Program (Section 6) of this document, would prevent, or appreciably reduce so as to have no adverse indirect impacts to the American burying beetle from covered activities. Specific actions to preclude indirect impacts to this species from covered activities include, but are not limited to, assessing habitat potential and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; minimizing soil disturbance by covered activities and, where disturbance occurs, recontouring to original grade and using native soils for backfill to preserve edaphic conditions (e.g., soil porosity, texture, and moisture regime) and to reduce the risk of red fire ant introduction, when possible; minimizing vehicular traffic in completing covered activities and controlling access to prevent future vehicular traffic unrelated to covered activities, which unabated would otherwise cause soil compaction and reduced habitat suitability; minimizing habitat fragmentation, where suitable or potential habitat cannot be avoided, by paralleling other existing rights-of-way, if feasible; limiting the clearing of access roads outside of the rights-of-way to only where absolutely necessary; and trimming or topping taller trees adjacent to the rights-of-way to the minimum necessary amount required for compliance with National Safety Codes and removing such trees only when they qualify as danger trees. Potential adverse indirect impacts to the American burying beetle resulting from covered activities are expected to be negligible.

5.2.5.3 Assessment of Take

5.2.5.3.1 Existing Facilities

Within the proposed Permit Area, the American burying beetle is restricted to Lamar and Red River counties, where the Applicant has 196 miles (315 kilometers) totaling 3,801 acres (1,539 hectares) of existing electric facility rights-of-way: 150 miles (241 kilometers) or 2,909 acres (1,178 hectares) in Lamar County and 46 miles (74 kilometers) or 892 acres (361 hectares) in Red River County. The American burying beetle is thought to be a habitat generalist. While habitat requirements are not fully understood at this time, biologists believe that the species prefers various types of habitat undisturbed by human influence, including oak-pine woodland, oak-hickory forest, open grassland, and edge habitat. Based on on-the-ground habitat assessment surveys in the field by qualified biologists and the species' diverse habitat requirements, the Applicant believes that 20 to 80 percent of its existing rights-of-way in these respective counties may qualify as potential habitat, meaning that at most 3,041 acres (1,231 hectares) of the Applicant's existing electric facility rights-of-way may be potential habitat (2,327 acres [942 hectares] in Lamar County and 714 acres [289 hectares] in Red River County) and could be impacted by operation and maintenance of the existing electric facilities (Table 5-5). Because of general and species-specific avoidance, minimization and conservation measures, and BMPs referenced above and established by the Conservation Program (Section 6) of this document, the Applicant believes

that indirect impacts to the American burying beetle from operation and maintenance of existing facilities will be avoided. Therefore, covered activities for existing facilities may affect and are likely to adversely affect the American burying beetle through direct impacts to at most 3,041 acres (1,231 hectares) of habitat under the proposed HCP.

5.2.5.3.2 New Facilities

Based on construction of a new 60-mile (97-kilometer)-long 345-kV electric transmission line (1,164 acres [471 hectares]), all of which passes through potential habitat areas with unavoidable impacts at an estimated rate of 80 percent on the new rights-of-way (the maximum percentage of habitat for existing rights-of-way), 931 acres (377 hectares) of American burying beetle potential habitat would be impacted. Because the American burying beetle is a mobile habitat generalist, found in oak-pine woodland, oak-hickory forest, pine forest, bottomland/riparian woodland, open grassland, open agricultural land, and edge habitat, the Applicant believes that measures can be taken when designing and constructing new facilities to avoid indirect take to this species. Implementation of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this document, will allow the avoidance of indirect impacts to the American burying beetle from construction of new electric facilities. Therefore, covered activities for new facilities may affect and are likely to adversely affect the American burying beetle through direct impacts to at most 931 acres (377 hectares) of habitat under the proposed HCP.

Table 5-5. Acres (Hectares) of Potential Impact to the American Burying Beetle

Facilities	County	Miles (Kilometers)		Rights-of-Way		Acres (Hectares) of Potential Impact ³	
		of Facilities ¹		Acres (Hectares) of Facilities ²			
Existing	Lamar	150	(241)	2,909	(1,178)	2,327	(942)
	Red River	46	(74)	892	(361)	714	(289)
	Total	196	(315)	3,801	(1,539)	3,041	(1,231)
Future	Direct	60	(97)	1,164	(471)	931	(377)
TOTAL		256	(412)	4,965	(2,009)	3,972	(1,608)

¹ Estimated total miles of facilities (electric transmission lines) within the distribution range of the American burying beetle.

² Estimated total right-of-way acreage of facilities within the distribution range of the American burying beetle based on 160-foot (49-meter)-wide rights-of-way.

³ Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

General Note: Numbers rounded.

5.2.6 Houston Toad

Impacts to the Houston toad from covered activities would be considered significant if they were to result in one or more of the following:

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- The existing primary threats to the habitat used by the species would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
 - The size of the Houston toad population in the proposed Permit Area would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).
 - The recovery tasks or actions of the Houston toad recovery plan were furthered or achieved (beneficial effects – no adverse effects) or were precluded from being implemented or achieved (adverse effects).

5.2.6.1 Direct Impacts

Potential adverse direct impacts resulting from the covered activities include injury or death of individual Houston toads and destruction or modification of habitat. Injury/death could occur as a result of vehicle or equipment strikes, from Houston toads being unearthed during ground-disturbing activities, and Houston toad eggs/tadpoles being destroyed if breeding/nursery sites are damaged. While these impacts would be more likely to occur during construction of new transmission facilities, they could also potentially occur during some maintenance/repair projects, but to a lesser degree. However, by minimizing project activities during the breeding season when Houston toads are widespread and not concentrated at the breeding sites, potential for vehicular mortality and mortality caused by unearthing a Houston toad during excavation activities is expected to be low. Because water management zones establishing a 50-foot (0.9-meter) buffer from water features such as stream channels, ponds, wetlands, springs, or seeps (i.e., potential breeding sites) in which activities that could result in the pollution of a potential breeding site will be prohibited, activities conducted in potential toad habitat outside of the breeding season are not expected to alter the number of potential breeding sites or to deter the Houston toads from breeding.

Construction of new transmission facilities, which typically involve vegetation removal, ground-clearing activities, and soil disturbance and/or compaction, would have the potential to destroy or modify the habitat, rendering it less suitable for Houston toads and potentially reducing the viability of affected populations. Such modification and/or destruction would include habitat fragmentation and locally alteration of native vegetation and soils such that resources required by the Houston toad are eliminated or the habitat becomes more favorable to competing species, such as the Gulf Coast toad or Woodhouse's toad. Significant habitat fragmentation, however, is unlikely to result from the covered activities because work areas are expected to continue to possess habitat value and the clearing would only be in narrow swaths.

While existing facilities such as substations and switching stations do not provide suitable habitat, ongoing uses/activities could impact individuals migrating or moving to adjacent habitat areas, especially during the breeding season, if such habitat occurs nearby. Maintenance activities are not expected to permanently affect Houston toad habitat, although some maintenance activities could result in minor, localized, but temporary decreases in the quality of foraging and sheltering habitat.

Apart from some soil compaction, disturbance associated with the covered activities is not expected to significantly alter the soil profile such that the Houston toads would be unable to burrow for aestivation and hibernation. Given the minimal area that would be impacted by the proposed activities, any temporary decrease in the amount of potential sheltering area available is not considered significant.

Like any species that depends on water for a part of its life cycle, accidental leaks or spills during construction or maintenance could result in impacts to the Houston toad. This species is particularly vulnerable to pollutants. Minimization of impacts to the Houston toad will be achieved through adherence to the avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document. These include, but are not limited to, avoiding potential habitat where practical, utilizing existing rights-of-way, minimizing the number of activities being performed during the Houston toad's breeding season, establishing water management zones, allowing revegetation of native species to occur and facilitating this process where needed, and implementing stormwater BMPs that address sediment, pollutant, and fuel and chemical hazards. Overall, adverse direct impacts to the Houston toad resulting from covered activities are expected to be minor to moderate.

5.2.6.2 Indirect Impacts

Potential adverse indirect impacts for the Houston toad may occur from covered activities. Vegetation clearing in potential toad habitat can result in changes in the arthropod community on the forest floor (which comprises the Houston toad's food supply), and desiccation of adult and juvenile Houston toads. Given that the Houston toad's current population levels are so low, any effects from vegetation clearing, even temporary ones, could be devastating to the species. Vegetation clearing may also result in localized increased densities of fire ants. This may in turn lead to decreased prey availability for the toad or increased predation rates on the toadlets by fire ants. Herbicides and pesticides may also lead to a reduction in future prey availability. However, herbicide and pesticide use will be prohibited in water management zones. During and immediately following construction of new facilities, prey would likely be unavailable or less available in the disturbed areas. Prey would remain more available in areas where only maintenance activities are being performed. Nevertheless, it is expected that impacts would be short-term and temporary, as the terrestrial invertebrates on which the Houston toad feeds would eventually reoccupy the disturbed areas and, after which, the toad would be expected to resume foraging therein. After construction, the rights-of-way would revegetate naturally or be seeded with native grasses, depending on landowner approval (Section 6). Typically, the Applicant follows the landowner's wishes when revegetating rights-of-way. When the landowner has no preference, the Applicant revegetates the rights-of-way with native species. If, because of landowner desires, the rights-of-way are revegetated with nonnative rather than native vegetation, the nonnative vegetation such as bermudagrass would potentially inhibit the toad's ability to burrow and disperse both within the rights-of-way and in adjacent habitat if the new vegetation encroaches there. Habitat fragmentation or alteration could potentially increase the opportunity for the Houston toad to hybridize with competitor species such as the Gulf Coast toad or Woodhouse's toad. Diseases could potentially be introduced with soils brought in offsite for fill.

Given current population levels, the Houston toad may no longer be able to withstand the burden of competition and disease. Adherence to the avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document, would prevent, or appreciably minimize so as to have no adverse indirect impacts to the Houston toad from covered activities. Specific actions to preclude indirect impacts to this species from covered activities include, but are not limited to, assessing habitat potential and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; minimizing soil disturbance by covered activities and, where disturbance occurs, recontouring to original grade and using native soils for backfill to preserve edaphic conditions (e.g., soil porosity, texture, and moisture regime) and to reduce the risk of red fire ant introduction; complying with the stormwater BMPs to prevent indirect impacts from sedimentation, erosion, contamination, and pollution; minimizing herbicide and pesticide use, to the maximum extent practicable, and using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence), and complying with Service (2004e) guidelines for pesticide application; and revegetating areas disturbed by covered activities with native species, when appropriate, to ensure invasive plant species do not colonize and establish in the rights-of-way and spread to adjacent habitats. Potential adverse indirect impacts to the Houston toad resulting from covered activities are expected to be minor.

5.2.6.3 Assessment of Take

5.2.6.3.1 Existing Facilities

The Applicant currently has 261 miles (420 kilometers) totaling 5,062 acres (2,049 hectares) of existing electric facility rights-of-way within the range of the Houston toad in the proposed Permit Area (Table 5-6). The Applicant estimates at most 411 acres (166 hectares) of potential Houston toad habitat could be directly impacted by the operation and maintenance of the existing electric facilities within the proposed Permit Area. The basis for this estimate is discussed below. Because of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this document, the Applicant believes that adverse indirect impacts to the Houston toad from operation and maintenance of existing facilities will be avoided. Therefore, covered activities for existing facilities may affect and are likely to adversely affect the Houston toad through direct impacts to at most 411 acres (166 hectares) of habitat under the proposed HCP.

Bastrop County. The Applicant currently has 9 miles (14 kilometers) or 175 acres (71 hectares) of existing electric facility rights-of-way in Bastrop County. An estimated maximum of 9 acres (4 hectares) of potential Houston toad habitat is associated with these existing electric transmission line facilities. Applicant facilities fall within the north-central part of the county. Based on field reconnaissance, a review of the soil survey for Bastrop County (Soil Conservation Service 1979), and facility locations, about 2 miles (3 kilometers), or 22 percent, of the Applicant's rights-of-way cross soils and forested

vegetation that could be classified as potential Houston toad habitat. Based on the Applicant’s past rights-of-way vegetation maintenance practices, it is reasonable to assume that forested encroachment from ingrowth of adjacent trees on the edge and successional transition to forested vegetational cover within the rights-of-way could be as high as 25 percent. Combining this estimate with the 22 percent value above to approximate the co-occurrence of soils and forested vegetation associated with Houston toad habitat results in an estimated maximum impact to potential habitat at 5 percent of existing facilities in the county (9 acres or 4 hectares).

Table 5-6. Acres (Hectares) of Potential Impact to the Houston Toad

Facilities	County	Miles		Rights-of-way Acres		Acres (Hectares) of	
		(Kilometers) ¹ of	Facilities ¹	(Hectares) of Facilities ²	Facilities ²	Potential Impact ³	Potential Impact ³
Existing	Bastrop	9	(14)	175	(71)	9	(4)
	Lee	11	(18)	213	(86)	4	(2)
	Leon	121	(195)	2,347	(950)	258	(104)
	Milam	104	(167)	2,017	(817)	121	(49)
	Robertson	16	(26)	310	(126)	19	(8)
	Total Existing	261	(420)	5,062	(2,049)	411	(166)
Future	Direct	100	(161)	1,939	(785)	213	(86)
	Indirect	100	(161)	1,939	(785)	11	(4)
	Total Future	200	(322)	3,878	(1,590)	224	(90)
Total		361	(581)	7,001	(2,835)	635	(257)

¹ Estimated total miles of facilities (electric transmission lines) within the distribution range of the Houston toad.

² Estimated total right-of-way acreage of facilities within the distribution range of the Houston toad based on 160-foot (49-meter)-wide rights-of-way.

³ Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

General Note: Numbers rounded.

Lee County. The Applicant currently has 11 miles (18 kilometers) or 213 acres (86 hectares) of existing electric facility rights-of-way in Lee County. An estimated maximum of 4 acres (2 hectares) of potential Houston toad habitat is associated with these existing electric transmission line facilities. Since the Lee County soil survey is not available (i.e., not published or out of print), this estimate is based on a review of aerial photography (Texas Natural Resources Information System 2004) and electronic soil data (Natural Resources Conservation Service 2004). Accordingly, the Applicant believes that at most 2 percent (4 acres or 2 hectares) of the Applicant’s rights-of-way in Lee County fall within areas that could be classified as potential Houston toad habitat.

Leon County. The Applicant currently has 121 miles (195 kilometers) or 2,347 acres (950 hectares) of existing electric facility rights-of-way in Leon County. An estimated maximum of 258 acres (104 hectares) of potential Houston toad habitat is associated with these existing electric transmission line facilities. Based on a review of soil surveys for Leon County (Soil Conservation Service 1989), about

45 percent of the Applicant's facilities are within soils and forested vegetation that could be classified as potential Houston toad habitat. According to the Applicant's past experience with rights-of-way maintenance practices, it is reasonable to assume that forested encroachment along the edge of, and transition to forested vegetational cover within, the rights-of-way could be as high as 25 percent. Combining this percentage with the 45 percent value above to approximate the probability for encountering the co-occurrence of soils and forested vegetation associated with the Houston toad results in maximum impacts to potential habitat at 11 percent of existing facilities in the county (258 acres or 104 hectares).

Milam County. The Applicant currently has 104 miles (167 kilometers) or 2,017 acres (817 hectares) of existing electric facility rights-of-way in Milam County. An estimated maximum of 121 acres (49 hectares) of potential Houston toad habitat is associated with these existing electric transmission line facilities. Since the Milam County soil survey is not available (i.e., not published or out of print), estimates are based on a review of aerial photography (Texas Natural Resources Information System 2004) and electronic soil data (Natural Resources Conservation Service 2004), as well as on-the-ground pedestrian habitat assessments. From these sources, the Applicant believes that at most 25 percent of their facilities are within areas that could be potential Houston toad habitat. Based on experience with historic rights-of-way maintenance practices, it furthermore is reasonable to assume that forested encroachment from ingrowth of adjacent trees on the edge and successional transition to forested vegetational cover within the rights-of-way could be as high as 25 percent. Combining this estimate with the 25 percent value above to approximate the co-occurrence of soils and forested vegetation associated with Houston toad habitat results in an estimated maximum impact to potential habitat at 6 percent of existing facilities in the county (121 acres or 49 hectares).

Robertson County. The Applicant currently has 16 miles (26 kilometers) or 310 acres (126 hectares) of existing electric facility rights-of-way in Robertson County. An estimated 19 acres (8 hectares) of potential Houston toad habitat is associated with these existing electric transmission line facilities. Since the Robertson County soil survey is not available (i.e., not published or out of print), this estimate is based on a review of aerial photography (Texas Natural Resources Information System 2004) and electronic soil data (Natural Resources Conservation Service 2004), as well as on-the-ground pedestrian habitat assessments. Based on these sources, the Applicant believes that about 25 percent of their facilities are within areas that could be potential Houston toad habitat. Furthermore, experience with historic rights-of-way maintenance practices suggests it is reasonable to assume that forested encroachment from ingrowth of adjacent trees on the edge and successional transition to forested vegetational cover within the rights-of-way could be between as high as 25 percent. Combining this estimate with the 25 percent value above to approximate the co-occurrence of soils and forested vegetation associated with Houston toad habitat results in an estimated maximum impact to potential habitat at 6 percent of existing facilities in the county (19 acres or 8 hectares).

5.2.6.3.2 New Facilities

The Applicant believes that at most 213 acres (86 hectares) of potential habitat may be directly impacted as a result of constructing new facilities. This estimate is based on construction of a new 345-kV electric transmission line, 100 miles (161 kilometers) or 1,939 acres (785 hectares) of which pass through potential habitat areas, with an estimated 11 percent of the new rights-of-way impacting potential habitat. This percentage is based on the highest maximum percentage (Leon County) estimated by county for the Applicant's existing facilities. The Applicant believes that estimates of encroached potential habitat on existing rights-of-way established before the ESA or listing of many of the current protected species are representative of the amount of potential habitat that might be encountered on new rights-of-way.

In the Utilities HCP for the Houston Toad (Service 2004d), 5 percent of the potential habitat was added for potential edge/indirect effects of newly constructed rights-of-way. Using this figure of 5 percent, the Applicant believes that between 1 and 11 acres (0.4 and 4 hectares) of potential habitat may be indirectly impacted as a result of constructing new facilities. Implementation of general and species specific BMPs, discussed in Section 6 of this document, will minimize or negate indirect impacts to the Houston toad from construction of new electric facilities. The total area of potential Houston toad habitat that may be impacted by both existing and new electric facilities would be between 92 and 635 acres or 37 and 257 hectares (see Table 5-6). Therefore, covered activities for new facilities may affect and are likely to adversely affect the Houston toad through impacts to at most 635 acres (257 hectares) of habitat under the proposed HCP.

5.2.6.3.3 Critical Habitat

Critical habitat for the Houston toad occurs in Bastrop and Burleson counties. Bastrop County is located in the proposed Permit Area, while Burleson County is not. In Bastrop County, no existing electric facilities are located within or adjacent to this critical habitat, and no new electric facilities will be built therein or adjacent thereto. No direct or indirect impacts to critical habitat for this species will occur from the covered activities. As such, impacts from covered activities proposed under this HCP will not result in the adverse modification of designated critical habitat for the Houston toad.

5.2.7 Whooping Crane

Impacts to the whooping crane from covered activities would be considered significant if they were to result in one or more of the following:

- The existing primary threats to the wetland stopover habitat used by the species during migration would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
- The size of the whooping crane population would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).

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- The recovery tasks or actions of the whooping crane recovery plan were furthered or achieved (beneficial effects – no adverse effects) or were precluded from being implemented or achieved (adverse effects).

5.2.7.1 Direct Impacts

The proposed Permit Area lies within the migration corridor for this species, and whooping crane spring/fall migration records have been documented for many counties within the proposed Permit Area (Austin and Richert 2001, Howe 1989, Oberholser 1974, Pulich 1988). In migration, travel primarily occurs in daylight during which whooping cranes ride the thermals and use favorable tailwinds, to attain speeds of up to 62 miles (100 kilometers) per hour and reach heights up to 6,200 feet (1,890 meters). Flight elevations are typically much higher than the Applicant's facilities. However, whooping cranes make frequent (seven to nine [Kuyt 1992]) stops to feed and rest during migration, and may become vulnerable to collision with powerlines when they descend from their normal flying altitudes of 1,000 to 6,000 feet (305 to 1,829 meters) and approach their stopover points. During this period, whooping cranes sometimes fly for several miles at very low altitude because of a lack of thermal updrafts. These lower altitude flights generally occur in the morning or late in the day, when low light levels may also be problematic. Occasionally whooping cranes migrate during the night, increasing the risk for collision. However, the greatest risk of collision is when whooping cranes are flying out from stopover sites to forage or are disturbed from a stopover site (Stehn 2011). Collision with powerlines is the greatest known source of mortality for fledged whooping cranes and has accounted for the death or serious injury of at least 45 whooping cranes since 1956 (Stehn and Wassenich 2008). Of the seven known mortalities and two serious injuries of whooping cranes from the Aransas-Wood Buffalo flock as a result of collisions with powerlines between 1956 and 2006, eight of the collisions involved distribution lines (Stehn and Wassenich 2008).

While the species will utilize a variety of habitats for foraging and roosting during these stops, whooping cranes seem to prefer isolated sites away from human activities. Habitat types utilized during migration include freshwater marshes, wet prairies, inland lakes, small farm ponds, upland grain fields, and riverine systems. Shallow flooded palustrine wetlands are often used for roosting, while croplands and emergent wetlands are typically used for feeding, but may also be used for roosting. Riverine habitats, such as submerged sandbars, are also often used for roosting. Most wetlands used for roosting are within 0.62 mile (1 kilometer) of a suitable feeding area, and whooping cranes will often make low-level flights between the two areas. Whooping cranes have an unpredictable pattern of stopover habitat use and may not use the same stopover sites annually. Whooping cranes are largely diurnal migrants and often stop wherever they happen to be late in the day when they find conditions no longer suitable for migration. Thus, a few cranes could stop at a small farm pond or wetland for one night and rarely or never use the same location again. Some areas, however, are used on a regular basis and are considered traditional stopover sites. Whooping cranes may spend several days at a stopover point (Armbruster 1990, Campbell 2003, CWS and the Service 2007, Howe 1987, 1989, Lewis 1995, Lingle et al. 1991, Service 2009a).

Within the United States, traditional whooping crane stopover areas—used for extended periods each year during spring and fall migrations (Melvin and Temple 1981)—have not been identified (Johnson and Temple 1980). However, numerous historic sightings have occurred in some areas due to prominent features that attract cranes from extended distances, and these locations predominantly have been designated critical habitat (Armbruster 1990, CWS and the Service 2005). No critical habitat has been defined within the Applicant’s proposed Permit Area; however, multiple sightings between years have occurred in proximity to some features. Nonetheless, nontraditional whooping crane stopover areas—suitable habitat used for roosting overnight or several days in inclement weather (Melvin and Temple 1981)—are present within the proposed Permit Area, as evidenced by confirmed historic sightings.

Despite avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document, the possibility of collision with the Applicant’s existing and new transmission and distribution lines exists. However, the likelihood appears to be relatively low based on past records and observations from databases, such as the Cooperative Whooping Crane Tracking Project which the Service instituted in 1975 to track sightings and currently maintains. Consequently, direct adverse impacts to the whooping crane resulting from covered activities are expected to be minor to moderate, contingent on collision occurrence and the effectiveness of avoidance, minimization, and mitigation efforts to prevent such an event.

5.2.7.2 Indirect Impacts

In addition to direct impacts from collision with powerlines, whooping cranes may avoid suitable stopover points because of their proximity to powerlines. The avoidance of such stopover habitat may force cranes to use suboptimal habitat or fly farther to find more suitable habitat (Service 2009a). In doing so, affected individuals may expend excess energy or undergo increased exposure to other threats in flight or while roosting, such as predation, disease, and disturbance, all of which would have adverse impacts. Given the size of the proposed Permit Area, it is unlikely that whooping cranes leaving the Aransas NWR in the spring to migrate north would be able to overfly the entire area without stopping. Therefore, most cranes would stop somewhere in the proposed Permit Area during spring migration. Whooping cranes typically migrate singly or in groups of two to five birds (CWS and the Service 2007). Assuming an average group size of four birds and a spring 2011 flock size of 279, up to 70 stopovers would have occurred in the proposed Permit Area during the spring 2011 migration (Stehn 2011). However, because the Applicant will avoid wetland areas and potentially suitable stopover habitat during the construction of new transmission and distribution facilities, and implementation of the avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document, the Applicant has concluded that adverse indirect impacts to the whooping crane from the covered activities will be avoided. Therefore, indirect impacts from covered activities will have a negligible effect on the whooping crane.

5.2.7.3 Assessment of Take

5.2.7.3.1 Existing Facilities

The proposed Permit Area lies within the migration corridor for this species, and whooping crane spring/fall migration records have been documented for many counties within the proposed Permit Area (Austin and Richert 2001, Howe 1989, Oberholser 1974, Pulich 1988). The Applicant currently has 4,804 miles (7,730 kilometers) of existing electric transmission line in the proposed Permit Area that is within the 180-mile (290-kilometer) primary whooping crane migration corridor, defined by the Service to include 95 percent of confirmed sightings (Table 5-7). Whooping cranes make frequent stops to feed and rest during migration, and may become vulnerable to collision with powerlines when they descend from their normal flying altitudes of 1,000 to 6,000 feet (305 to 1,829 meters) and approach their stopover points, as well as when they make local movements to foraging areas during stopovers.

Table 5-7. Miles (Kilometers) of Existing Facilities Within the Whooping Crane Migration Corridor

Facilities	County	% County in Migration Corridor	Miles (Kilometers) of Facilities ¹	County	% County in Migration Corridor	Miles (Kilometers) of Facilities ¹	
Existing	Archer	100	189 (304)	Jack	100	91 (146)	
	Bastrop	100	9 (14)	Johnson	100	160 (257)	
	Baylor	100	41 (66)	Kaufman	46	68 (110)	
	Bell	100	241 (388)	Lee	100	11 (18)	
	Bosque	100	44 (71)	Leon	67	81 (131)	
	Brown	96	76 (122)	Limestone	100	39 (63)	
	Clay	100	99 (159)	McLennan	100	226 (364)	
	Collin	56	151 (243)	Milam	100	104 (167)	
	Comanche	100	109 (175)	Mills	100	19 (31)	
	Cooke	100	86 (138)	Montague	100	29 (47)	
	Coryell	100	7 (11)	Navarro	98	233 (376)	
	Dallas	100	516 (830)	Palo Pinto	100	72 (116)	
	Denton	100	126 (203)	Parker	100	174 (280)	
	Eastland	100	99 (159)	Robertson	100	16 (26)	
	Ellis	100	241 (388)	Shackelford	99	36 (59)	
	Erath	100	108 (174)	Somervell	100	21 (34)	
	Freestone	82	124 (199)	Stephens	100	111 (179)	
	Grayson	41	85 (137)	Tarrant	100	360 (579)	
	Henderson	7	14 (22)	Throckmorton	100	37 (60)	
	Hill	100	179 (288)	Wichita	100	173 (278)	
	Hood	100	72 (116)	Wise	100	127 (204)	
Total Existing Miles (Kilometers):				4,804 (7,730)			

¹Estimated total miles (kilometers) of existing facilities (electric transmission lines) within the 180-mile ((290-kilometer) whooping crane migration corridor calculated from transmission line extent in county and percent of county in migration corridor.

General Note: Numbers rounded.

It is unknown at the present time how many of the Applicant's existing electrical facilities are in the vicinity of suitable stopover areas. Information on known stopover areas in Texas is limited. It is also unknown if the Applicant's current facilities are having a direct impact since the Applicant has no documentation of past whooping crane collisions. Federal and state records of whooping crane sightings in migration, which began through the Cooperative Whooping Crane Tracking Project in 1975 and incorporate historic sightings dating as far back as 1943, do not document the occurrence of any whooping crane injuries sustained through collision with the Applicant's existing facilities. Three of the nine known Aransas-Wood buffalo whooping crane collisions with powerlines have occurred in the proposed Permit Area: collision with a transmission line in Lampasas County in May 1956; collision with a distribution line in Coryell County in October 1982; and collision with a distribution line in Comanche County in April 2002 (Stehn 2011). The Applicant owns none of these powerlines and currently has no transmission lines in Lampasas County.

It is also unknown if the Applicant's current facilities are having an indirect impact on the species. Whooping cranes may avoid suitable stopover points because of the proximity of powerlines. The avoidance of stopover habitat by cranes may force them to use suboptimal habitat or fly farther to find more suitable habitat (Armbruster 1990, Campbell 2003, CWS and the Service 2007, Howe 1987, 1989, Lingle et al. 1991, Lewis 1995, Service 2009a). Availability of potentially suitable stopover habitat within the migration corridor does not appear to be limited for the proposed Permit Area based on desktop review using multiple datasets (see Appendix), though realized habitat availability is uncertain. Furthermore, the zone of influence for whooping crane avoidance of powerlines is suggested to be on the scale of 328 feet (100 meters) or greater and lower than for features such as roads, bridges, single dwellings, and urban areas (Armbruster 1990). Therefore, indirect avoidance costs for suitable stopover habitat in proximity to powerlines should result in minimal flight extension and selection of suboptimal habitat, assuming stopover habitat quality is nonrandomly clustered on the landscape as suggested by observed correlations with large-scale spatial patterns in land cover (Richert et al. 1999, Richert and Church 2001) and the high suitability of landscapes characterized by wetland mosaics (Johns et al. 1997, Richert et al. in press).

Implementation of mitigation measures established by the Conservation Program (Section 6) of this document should minimize adverse direct and indirect impacts to the whooping crane from covered activities for existing facilities. To provide mitigation for potential incidental whooping crane impacts, the Applicant will install bird flight diverters or other approved devices to clearly mark an extent of existing, high priority transmission line or distribution line within the whooping crane migration corridor (when these lines are temporarily out of service) equal to the length of new transmission line constructed within 1 mile (1.6 kilometers) of known occupied habitat or potentially suitable stopover habitat. Only those sections of the existing lines within 1 mile (1.6 kilometers) of stopover habitat will be marked. Installation would occur when lines are taken out of service for repair or upgrade, and methods used will be in accordance with the Avian Power Line Interaction Committee's "Mitigating Bird Collisions with Power Lines: The State of the Art in 1994" (Avian Power Line Interaction Committee 1994) or, to the greatest extent practicable, the latest industry standards for preventing avian powerline interactions.

Prioritization of existing transmission lines to determine facilities with the highest probability for whooping crane collision was model-derived based on location within the whooping crane migration corridor and the availability of potential stopover habitat within a 1-mile (1.6-kilometer) radius, as discussed in the Appendix.

5.2.7.3.2 New Facilities

The Applicant will, when routing new transmission lines, avoid and route around, where practical, known stopover areas and potentially suitable stopover habitat of the whooping crane. The Service (2009a) defines suitable whooping crane habitat as shallow wetlands in open, nonwooded areas free from human disturbance, such as nearby roads or buildings, with at least some water area less than 18 inches (45.7 centimeters) deep. Such habitat includes marshes, lake edges, or rivers. Prior to commencement of clearing and construction activities within the 180-mile (290-kilometer) whooping crane migration corridor, defined by the Service to include 95 percent of confirmed sightings, the Applicant or its consultant will conduct field habitat assessment surveys to determine potential stopover habitat for the whooping crane. Any sections of new transmission lines constructed within 1 mile (1.6 kilometers) of known occupied or potentially suitable stopover habitat will be clearly marked with bird flight diverters or other approved devices in accordance with the Avian Power Line Interaction Committee's "Mitigating Bird Collisions with Power Lines: The State of the Art in 1994" (Avian Power Line Interaction Committee 1994) or, to the greatest extent practicable, the latest industry standards for preventing avian powerline interactions. For all new transmission lines the flight diverters will be placed on the static wire.

Deterrent techniques of marking power lines have been shown to reduce the risk of line strike by 50 to 80 percent (Brown and Drewien 1995, Morkill and Anderson 1991, Yee 2008). Thus, marking those sections of new transmission line within 1 mile (1.6 kilometers) of known or potential stopover habitat within the whooping crane migration corridor (minimization) and an equal amount of existing transmission line or distribution line within 1 mile (1.6 kilometers) of known or potential stopover habitat within the migration corridor (mitigation) should reduce the number of power line collisions and thus save lives. Nevertheless, despite the avoidance, minimization, and mitigation measures to reduce the potential for collision mortality by avoiding routing near potential stopover habitat when practical, clearly marking new lines with bird flight diverters when this is not practical, and marking an equivalent length of high priority existing lines, migrating whooping cranes could still become victims of collisions with powerlines.

Based on discussions with Service representatives (Omar Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2010), the Applicant estimates that, despite no recorded occurrence of injury or mortality attributable to existing facilities, over the 30-year life of the permit a high potential remains that one whooping crane may be killed as a result of collision with its electrical facilities and is therefore requesting an incidental take permit for this one bird. Because of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established in the

Conservation Program (Section 6) of this document, the Applicant believes that indirect impacts to the whooping crane from construction of new facilities will be avoided.

5.2.7.3.3 Critical Habitat

Critical habitat for the whooping crane does not occur within the proposed Permit Area. No direct or indirect impacts to critical habitat for this species will occur from the covered activities. As such, impacts from covered activities proposed under this HCP will not result in the adverse modification of designated critical habitat for the whooping crane.

5.2.8 Golden-Cheeked Warbler

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

- The existing primary threats to the habitat used by the species would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
- The size of the golden-cheeked warbler population in the proposed Permit Area would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).
- The recovery tasks or actions of the golden-cheeked warbler recovery plan were furthered or achieved (beneficial effects – no adverse effects) or were precluded from being implemented or achieved (adverse effects).

5.2.8.1 Direct Impacts

Loss of habitat could result in adverse direct impacts to the breeding and foraging success of this species. Clearing of vegetation and construction activities have the potential to decrease habitat suitability for the golden-cheeked warbler by causing habitat fragmentation and locally altering native vegetation. Such disturbances could either eliminate resources required by the golden-cheeked warbler or cause the disturbed habitat to become more favorable to competing species. A decrease in habitat quality could force some individuals to migrate from suitable habitat to less-desirable locations where the species' habitat may already be at its carrying capacity. Once the rights-of-way of new electric facilities have been established, the vegetation will be periodically cleared at a frequency prohibitive to the development of habitat structure suitable for the species. Therefore, golden-cheeked warbler habitat within the rights-of-way will not be reestablished.

Adherence to the avoidance, minimization, and conservation measures and BMPs, established by the Conservation Program (Section 6) of this document, would minimize adverse direct impacts to the golden-cheeked warbler from covered activities. Specific actions to reduce direct impacts to this species from covered activities include, but are not limited to, assessing habitat suitability and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered

activities, to the maximum extent practicable; minimizing habitat fragmentation, where suitable or potential habitat cannot be avoided, by paralleling other existing rights-of-way, if feasible; limiting clearing of oak-juniper woodland vegetation to the minimum necessary to operate and maintain lines; performing covered activities, if within 300 feet (91 meters) of golden-cheeked warbler habitat, outside of the breeding season, when practicable, and in accordance with strict protocol to preclude impacts when impracticable; limiting clearing of access roads unless absolutely necessary; and trimming taller trees adjacent to the rights-of-way the minimum amount necessary. Overall, adverse direct impacts to the golden-cheeked warbler resulting from covered activities are expected to be minor to moderate.

5.2.8.2 Indirect Impacts

As well as having a direct impact, habitat loss can indirectly impact adjacent areas of remaining habitat, because the warbler prefers large blocks of unfragmented, closed canopy woodlands. A newly created edge can lead to increased nest predation from species, such as the blue jay, and also increase brown-headed cowbird brood parasitism. These adverse indirect effects would occur most strongly in warbler habitat closest to the edge and diminish with increasing distance from the edge. Habitat fragmentation may have additional indirect impacts: reduced habitat suitability due to increased deer browse of hardwood regeneration in edge environments; greater susceptibility of populations to inbreeding effects and stochastic extirpation due to gene flow limitations; and decreased prey availability, vegetation structure, and foraging activity from microhabitat alteration (Service 1992b). Furthermore, introduction or increased abundance of imported red fire ants from covered activities could indirectly affect golden-cheeked warbler by decreasing prey availability, species richness and abundance, and increasing brood parasitism. Should covered activities facilitate the spread of oak wilt and consequent mortality of oak species, a commensurate indirect effect on golden-cheeked warbler would be a reduction in the suitability of existing occupied or potential future habitat. Historically, most HCPs processed by the Service have suggested that indirect impacts affect golden-cheeked warblers up to 300 feet (91 meters) from a newly created edge.

While it is recognized that adverse indirect impacts will occur as a result of the preferred alternative, the extent to which these indirect impacts would affect this species is not known. However, indirect impacts from covered activities are not expected to be significant and would largely be minimized by the avoidance, minimization and conservation measures and other BMPs established in the Conservation Program (Section 6) of this HCP. Specific actions to reduce indirect impacts to this species from covered activities include, but are not limited to, assessing habitat potential and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; minimizing habitat fragmentation, where suitable or potential habitat cannot be avoided, by paralleling other existing rights-of-way, if feasible; minimizing soil disturbance by covered activities and, where disturbance occurs, using native soils for backfill and revegetating with native vegetation to reduce the risk of red fire ant introduction; limiting clearing of oak-juniper woodland vegetation to the minimum necessary to operate and maintain lines; performing covered activities, if

within 300 feet (91 meters) of golden-cheeked warbler habitat, outside of the breeding season, when practicable, and in accordance with protocol to preclude impacts when impracticable; limiting the clearing of access roads outside of the rights-of-way to only where absolutely necessary; trimming or topping taller trees adjacent to the rights-of-way to the minimum necessary amount required for compliance with National Safety Codes and removing such trees only when they qualify as danger trees; and following guidelines for preventing the spread of oak wilt when clearing or trimming trees within counties where oak wilt is known to occur. Overall, adverse indirect impacts to the golden-cheeked warbler resulting from covered activities are expected to be minor.

5.2.8.3 Assessment of Take

5.2.8.3.1 Existing Facilities

The Applicant currently has 2,131 miles (3,431 kilometers) totaling 41,328 acres (16,732 hectares) of existing electric facility rights-of-way within the range of the golden-cheeked warbler in the proposed Permit Area (Table 5-8a). The Applicant estimates that 787 acres (319 hectares) of potential golden-cheeked warbler habitat could be directly impacted by the operation and maintenance of the existing electric facilities within the proposed Permit Area. As recommended by the Service (Clayton Napier, the Service, pers. comm. to D. Green, PBS&J, 2010), proposed Permit Area counties have been grouped by recovery region (Service 1992b) for purposes of take assessment. In the recovery plan for the golden-cheeked warbler, which is currently under revision, the recovery strategy includes the protection of sufficient breeding habitat to ensure the continued existence of at least one self-sustaining population, viable either on its own or through connection with other populations, within each of eight defined recovery regions (Service 1992b). The definition of a viable population is not established within the recovery plan, though it is suggested to include from 500 breeding pairs to several thousand individuals. More recent review, however, indicates that the minimum requirement may be as many as 3,000 breeding pairs (Alldredge et al. 2002, Service 1996). Recovery regions were established for the species' entire known breeding range at that time based on geologic, vegetational, or watershed boundaries, and as such, intersected political county boundaries. Permit Area counties have been grouped within recovery regions whose boundaries have been adjusted to correspond to county lines so as to facilitate the planning process (Morrison et al. 2010). However, the Morrison et al. (2010) study has not been peer reviewed or accepted by the Service. Nevertheless, the study represents recent data. As noted above, the Recovery Plan is under revision. Recovery regions may change, and other changes may be made. Existing facilities within the proposed Permit Area occur in Recovery Regions 1, 2, and 3. Additionally, construction of new facilities under the covered activities is proposed in Recovery Regions 4 and 5. As such, Recovery Regions 7 and 8 are outside of the proposed Permit Area and will not be affected by covered activities.

Table 5-8a. Acres (Hectares) of Potential Impact to Golden-Cheeked Warbler Habitat by Recovery Region for Existing Facilities

Facilities	County	Miles (Kilometers) of Facilities ¹	Rights-of-Way Acres (Hectares) of Facilities ²	Assessment of Habitat Availability and Potential Impacts from Covered Activities									
				Assessment of Take		from NRCS Biological Opinion (Service 2004g)				from Morrison et al. (2010)			
						Acres (Hectares) of Potential Impact ³	Estimated Acres (Hectares) of Golden- Cheeked Warbler Habitat	% of Habitat Affected by Incidental Take ⁴	Estimated Acres (Hectares) of Golden- Cheeked Warbler Habitat	% of Habitat Affected by Incidental Take ⁴			
Recovery Region 1													
Existing	Eastland	99	(159)	1,920	(777)	77	(31)	8,265	(3,346)	0.93			
	Palo Pinto	72	(116)	1,396	(565)		0	31,134	(12,605)	0			
	Stephens	111	(179)	2,153	(872)	183	(74)	9,823	(3,977)	1.86			
	Young	166	(267)	3,219	(1,303)		0		N/A	0			
	Region 1 Total	448	(721)	8,688	(3,517)	260	(105)	49,222	(19,928) ⁵	0.53	280,783	(113,677)	0.09
Recovery Region 2													
Existing	Bosque	44	(71)	853	(345)	72	(29)	4,147	(1,679)	1.74			
	Dallas	516	(831)	10,007	(4,051)	130	(53)		N/A	N/A			
	Erath	108	(174)	2,095	(848)	24	(10)	995	(403)	2.41			
	Hill	179	(288)	3,472	(1,406)		0	566	(229)	0			
	Hood	72	(116)	1,396	(565)	32	(13)	516	(209)	6.20			
	Johnson	160	(258)	3,103	(1,256)	3	(1)	4,197	(1,699)	0.07			
	Somervell	21	(34)	407	(165)	8	(3)	3,167	(1,282)	0.25			
	Region 2 Total	1,100	(1,771)	21,333	(8,637)	269	(109)	13,587	(5,501) ⁶	1.98	369,236	(149,488)	0.07
Recovery Region 3													
Existing	Bell	241	(388)	4,674	(1,892)	186	(75)	28,331	(11,470)	0.66			
	Comanche	109	(175)	2,114	(856)	63	(26)		N/A	N/A			
	Coryell	7	(11)	136	(55)	9	(4)	28,524	(11,548)	0.03			
	McLennan	226	(364)	4,383	(1,774)		0	2,159	(874)	0			
	Region 3 Total	583	(939)	11,307	(4,578)	258	(104)	64,304	(26,034) ⁷	0.40	414,427	(167,784)	0.06
Total Existing		2,131	(3,431)	41,328	(16,732)	787	(319)	1,178,051	(476,944) ⁸	0.07	4,148,138	(1,679,408) ⁵	0.02

¹Estimated total miles (kilometers) of facilities (electric transmission lines) within the distribution range of the golden-cheeked warbler.

²Estimated total right-of-way acreage of facilities within the distribution range of the golden-cheeked warbler based on 160-foot (49-meter)-wide rights-of-way.

³Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

⁴Based on maximum acreage of impact to suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

⁵Estimated total habitat does not include Young County.

⁶Estimated total habitat does not include Dallas County.

⁷Estimated total habitat includes Lampasas and Hamilton counties but does not include Comanche County.

⁸Includes entire estimated habitat area across recovery regions established by the recovery plan.

Note: Numbers depicted are rounded and as such apparent discrepancies with totals are due to rounding error of subtotals.

Table 5-8b. Acres (Hectares) of Potential Impact to Golden-Cheeked Warbler Habitat by Recovery Region for New Facilities

Facilities	Predicted % of Total Future Facilities	Miles (Kilometers) ¹ of Facilities	Rights-of-Way Acres (Hectares) of Facilities ²	Assessment of Potential Habitat Availability and Potential Impacts from Covered Activities									
				Assessment of Take		from NRCS Biological Opinion (Service 2004g)		from Morrison et al. (2010)					
				Acres (Hectares) of Potential Impact ³		Estimated Acres (Hectares) of Golden- Cheeked Warbler Habitat	% of Habitat Affected by Incidental Take ⁴	Estimated Acres (Hectares) of Golden-Cheeked Warbler Habitat	% of Habitat Affected by Incidental Take ⁴				
Recovery Region 1													
Future Direct				93	(38)				0.19			0.03	
Future Indirect				349	(141)				0.71			0.12	
Subtotal	20	60	(97)	1,164	(471)	442	(179)	49,222	(19,928) ⁵	0.90	280,783	(113,677)	0.16
Recovery Region 2													
Future Direct				140	(57)				1.03			0.04	
Future Indirect				524	(212)				3.86			0.14	
Subtotal	30	90	(145)	1,745	(706)	664	(269)	13,587	(5,501) ⁶	4.89	369,236	(149,488)	0.18
Recovery Region 3													
Future Direct				163	(66)				0.25			0.04	
Future Indirect				611	(247)				0.95			0.15	
Subtotal	35	105	(169)	2,036	(824)	774	(313)	64,304	(26,034) ⁷	1.20	414,427	(167,784)	0.19
Recovery Region 4													
Future Direct				35	(14)				0.04			0.01	
Future Indirect				131	(53)				0.14			0.02	
Subtotal	7.5	22.5	(37)	436	(177)	166	(67)	92,264	(37,354)	0.18	597,862	(242,049)	0.03
Recovery Region 5													
Future Direct				35	(14)				0.03			0.01	
Future Indirect				131	(53)				0.09			0.02	
Subtotal	7.5	22.5	(37)	436	(177)	166	(67)	138,394	(56,030)	0.12	628,790	(254,571)	0.03
Direct total				465	(188)				0.04			0.01	
Indirect total				1,745	(706)				0.15			0.04	
Total Future	100	300	(483)	5,818	(2,355)	2,210	(895)	1,178,051	(476,944) ⁸	0.19	4,148,138	(1,679,408) ⁸	0.05

¹Estimated total miles (kilometers) of facilities (electric transmission lines) within the distribution range of the golden-cheeked warbler.

²Estimated total right-of-way acreage of facilities within the distribution range of the golden-cheeked warbler based on 160-foot (49-meter)-wide rights-of-way.

³Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

⁴Based on maximum acreage of impact to suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

⁵Estimated total habitat does not include Young County.

⁶Estimated total habitat does not include Dallas County.

⁷Estimated total habitat includes Lampasas and Hamilton counties but does not include Comanche County.

⁸Includes entire estimated habitat area across recovery regions established by the recovery plan.

Note: Numbers depicted are rounded and as such apparent discrepancies with totals are due to rounding error of subtotals.

Table 5-8c. Acres (Hectares) of Potential Impact to Golden-Cheeked Warbler Habitat by Recovery Region for Covered Activities.

Facilities	Acres (Hectares) of Potential Impact ¹		from NRCS Biological Opinion (Service 2004g)		from Morrison et al. (2010)		% of Habitat Affected by Incidental Take ²		
			Estimated Acres (Hectares) of Golden-Cheeked Warbler Habitat		Estimated Acres (Hectares) of Golden-Cheeked Warbler Habitat				
Recovery Region 1									
Existing Facility Direct Impacts	260	(105)						0.53	0.09
Future Facility Direct Impact	93	(38)						0.19	0.03
Future Facility Indirect Impacts	349	(141)						0.71	0.12
Recovery Region 1 Total	702	(284)	49,222	(19,928) ³		280,783	(113,677)	1.43	0.25
Recovery Region 2									
Existing Facility Direct Impacts	269	(109)						1.98	0.07
Future Facility Direct Impact	140	(57)						1.03	0.04
Future Facility Indirect Impacts	524	(212)						3.86	0.14
Recovery Region 2 Total	933	(378)	13,587	(5,501) ⁴		369,236	(149,488)	6.87	0.25
Recovery Region 3									
Existing Facility Direct Impacts	258	(104)						0	0.06
Future Facility Direct Impact	163	(66)						0.25	0.04
Future Facility Indirect Impacts	611	(247)						0.95	0.15
Recovery Region 3 Total	1,032	(418)	64,304	(26,034) ⁵		414,427	(167,784)	1.60	0.25
Recovery Region 4									
Existing Facility Direct Impacts	0							0	0
Future Facility Direct Impact	35	(14)						0.04	0.01
Future Facility Indirect Impacts	131	(53)						0.14	0.02
Recovery Region 4 Total	166	(67)	92,264	(37,354)		597,862	(242,049)	0.18	0.03
Recovery Region 5									
Existing Facility Direct Impacts		0						0	0
Future Facility Direct Impact	35	(14)						0.03	0.01
Future Facility Indirect Impacts	131	(53)						0.09	0.02
Recovery Region 5 Total	166	(67)	138,394	(56,030)		628,790	(254,571)	0.12	0.03
Direct Impacts Total	1,252	(507)						0.11	0.03
Indirect Impacts Total	1,745	(706)						0.15	0.04
Total Impacts	2,997	(1,213)	1,178,051	(476,944)⁶		4,148,138	(1,679,408)⁶	0.25	0.07

¹Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

²Based on maximum acreage of impact to suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

³Estimated total habitat does not include Young County.

⁴Estimated total habitat does not include Dallas County.

⁵Estimated total habitat includes Lampasas and Hamilton counties but does not include Comanche County.

⁶Includes entire estimated habitat area across recovery regions established by the recovery plan.

Note: Numbers depicted are rounded and as such apparent discrepancies with totals are due to rounding error of subtotals.

The exact extent of suitable golden-cheeked warbler habitat within each recovery region and across the species' breeding range is not known with great certainty given inherent difficulties and discrepancies between assessment methods used. Since the scale required to assess potential impacts from covered activities to golden-cheeked warbler is at the level of recovery regions (conformed to county boundaries) and acknowledging discrepancies between habitat assessments, impacts from incidental take are evaluated according to two habitat assessments that provide data at this scale and an extent that covers the entire 35-county breeding range as defined by the Service (1992b). The NRCS Biological Opinion (Service 2004g) data are based on the unpublished map of Diamond and True (2002) who examined the National Land Cover Datalayer (NLCD), the Gap Analysis land cover data for Texas, and a land cover they developed for the Service using circa 1986 and 1996–1997 satellite data. The Morrison et al. (2010) data were attained through stratified random sampling-based field surveys in 2008 and 2009 to develop a spatially explicit model (Model III) to predict patch-specific occupancy rates of warblers. Based on comparison with other available models, Morrison et al. (2010) suggest that their estimates provide the best available data on habitat availability to date.

Based on these data, the Applicant estimates that incidental take by covered activities for existing facilities could range between 0.40 and 1.98 percent (Service 2004g) and 0.06 and 0.09 percent (Morrison et al. 2004) of potential golden-cheeked warbler habitat for each recovery region included in the proposed Permit Area (see Table 5-8a). The basis for these estimates is discussed below. The Applicant believes that implementation of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this document, will prevent, or appreciably reduce so as to have no adverse indirect impacts to the golden-cheeked warbler from operation and maintenance of the existing electric facilities within the proposed Permit Area.

Recovery Region 1

Eastland County. The Applicant currently has 99 miles (159 kilometers) or 1,920 acres (777 hectares) of existing electric facility rights-of-way in Eastland County. An estimated 15 to 77 acres (6 to 31 hectares) of potential golden-cheeked warbler habitat is within the rights-of-way for these existing electric transmission line facilities. Based on on-the-ground pedestrian habitat assessments by qualified biologists conducted in Bell, Bosque, and Erath counties, the Applicant believes that about eight percent of the rights-of-way intersect or are adjacent to areas that qualify as potential habitat. Potential habitat would occur in historically cleared rights-of-way where forest encroachment has advanced over a prolonged maintenance interval sufficient to develop structural attributes suitable for golden-cheeked warbler. In most cases, proposed maintenance activities will be conducted in cleared rights-of-way; therefore, habitat modification is unlikely, although some clearing may be necessary due to forested encroachment from ingrowth of adjacent trees on the edge and successional transition to forested vegetational cover within the existing rights-of-way. Based on experience from on-the-ground pedestrian habitat assessments conducted by qualified biologists, the Applicant believes that forested encroachment within the existing rights-of-way falls in the range of 10 to 50 percent. Combining these percentages,

operation and maintenance activities would impact potential golden-cheeked warbler habitat within, at most, 4 percent (77 acres or 31 hectares) of existing electric facility rights-of-way in Eastland County.

Stephens County. The Applicant currently has 111 miles (179 kilometers) or 2,153 acres (872 hectares) of existing electric facility rights-of-way in Stephens County. An estimated 37 to 183 acres (15 to 74 hectares) of potential golden-cheeked warbler habitat is within the rights-of-way for these existing electric transmission line facilities. About 85 percent of the existing facilities fall within ecological areas that may contain potential golden-cheeked warbler habitat. However, based on on-the-ground pedestrian habitat assessments conducted by qualified biologists in Hood, Bosque, and Erath counties, the Applicant believes that only about 20 percent of habitat in the rights-of-way within these ecological areas (i.e., about 17 percent or 366 acres [148 hectares] of the Applicant's existing Stephens County rights-of-way) could be within areas that qualify as potential habitat. Potential habitat would occur in historically cleared rights-of-way where forest encroachment has advanced over a prolonged maintenance interval sufficient to develop structural attributes suitable for golden-cheeked warbler. In most cases, proposed maintenance activities will be conducted in cleared rights-of-way; therefore, habitat modification is unlikely, although some clearing may be necessary due to forested encroachment from ingrowth of adjacent trees on the edge and successional transition to forested vegetational cover within the existing rights-of-way. Based on experience from on-the-ground pedestrian habitat assessments by qualified biologists, the Applicant believes that forested vegetational encroachment within the existing rights-of-way falls in the range of 10 to 50 percent. Combining these percentages, operation and maintenance activities would impact potential golden-cheeked warbler habitat within, at most, 8.5 percent (183 acres or 74 hectares) of existing electric facility rights-of-way in Stephens County.

Recovery Region 2

Bosque County. The Applicant currently has 44 miles (71 kilometers) or 853 acres (345 hectares) of existing electric facility rights-of-way in Bosque County. An estimated 33 to 72 acres (13 to 29 hectares) of potential golden-cheeked warbler habitat is within the rights-of-way for these existing electric transmission line facilities. Potential habitat occurs in historically cleared rights-of-way where forest encroachment has advanced through ingrowth and successional transition to forested vegetational cover over a prolonged maintenance interval sufficient to develop structural attributes suitable for golden-cheeked warbler. Pedestrian habitat assessments in the field have been conducted on 45 percent (i.e., 20 miles or 32 kilometers) of the rights-of-way in this county. About 33 acres (13 hectares) of encroached potential habitat were identified on 20 miles (32 kilometers) of the rights-of-way. Extrapolation of this percentage (approximately 8.4 percent) to the rest of the right-of-way mileage in this county results in a maximum of 72 acres (29 hectares). If one assumes that the observed acreage as the minimum and the extrapolated acreage as the maximum, the range of potential habitat within existing rights-of-way for this county is 33 to 72 acres (13 to 29 hectares). Therefore, operation and maintenance activities would impact potential golden-cheeked warbler habitat within, at most, 8.4 percent (72 acres or 29 hectares) of the existing electric facility rights-of-way in Bosque County. It should be noted that

golden-cheeked warblers were observed during presence/absence surveys conducted in 2004 on about 3 miles (5 kilometers) of rights-of-way (Whitenton Group 2004b).

Dallas County. The Applicant currently has 516 miles (831 kilometers) or 10,007 acres (4,051 hectares) of existing electric facility rights-of-way in Dallas County. An estimated 26 to 130 acres (11 to 53 hectares) of potential golden-cheeked warbler habitat is within the rights-of-way for these existing electric transmission line facilities. About 13 percent of the facilities fall within the southwestern corner of Dallas County and, thus, in ecological areas that may contain potential golden-cheeked warbler habitat. Also, based on vehicular reconnaissance conducted in Dallas County, the Applicant believes that about 20 percent of the rights-of-way within these ecological areas (i.e., about 2.6 percent or 260 acres [105 hectares] of the Applicant's existing Dallas County rights-of-way) could be within areas that qualify as potential habitat. Potential habitat would occur in historically cleared rights-of-way where forest encroachment has advanced over a prolonged maintenance interval sufficient to develop structural attributes suitable for golden-cheeked warbler. In most cases, proposed maintenance activities will be conducted in cleared rights-of-way; therefore, habitat modification is unlikely, although some clearing may be necessary due to forested encroachment from ingrowth of adjacent trees on the edge and successional transition to forested vegetational cover within the existing rights-of-way. Based on experience from on-the-ground pedestrian habitat assessments, the Applicant believes that forested vegetational encroachment falls in the range of 10 to 50 percent of its existing rights-of-way. Combining these percentages, operation and maintenance activities would impact potential golden-cheeked warbler habitat within, at most, 1.3 percent (130 acres or 53 hectares) of existing electric facility rights-of-way in Dallas County.

Erath County. The Applicant currently has 108 miles (174 kilometers) or 2,095 acres (848 hectares) of existing electric facility rights-of-way in Erath County. An estimated 11 to 24 acres (4 to 10 hectares) of potential golden-cheeked warbler habitat is within the rights-of-way for these existing electric transmission line facilities. Potential habitat occurs in historically cleared rights-of-way where forest encroachment has advanced through ingrowth and successional transition to forested vegetational cover over a prolonged maintenance interval sufficient to develop structural attributes suitable for golden-cheeked warbler. On-the-ground pedestrian habitat assessments have been conducted by qualified biologists on 40 percent (i.e., 50 miles or 80 kilometers) of the rights-of-way in this county. About 11 acres (4.5 hectares) of encroached potential habitat were identified on the 50 miles or 80 kilometers of rights-of-way. Extrapolation of this percentage (approximately 1 percent) to the rest of the right-of-way mileage in this county results in a maximum of 24 acres (10 hectares). If one assumes the observed acreage as the minimum and the extrapolated acreage as the maximum, the range of potential habitat within existing rights-of-way for this county is 11 to 24 acres (4 to 10 hectares). Therefore, operation and maintenance activities would impact potential golden-cheeked warbler habitat within, at most, one percent (24 acres or 10 hectares) of the existing electric facility rights-of-way in Erath County. It should be noted that golden-cheeked warblers were observed during presence/absence surveys conducted in 2004 on about 0.5 mile (0.8 kilometer) of rights-of-way (Whitenton Group 2004a).

Hood County. The Applicant currently has 72 miles (116 kilometers) or 1,396 acres (565 hectares) of existing electric facility rights-of-way in Hood County. An estimated 7 to 32 acres (3 to 13 hectares) of potential golden-cheeked warbler habitat is within the rights-of-way for these existing electric transmission line facilities. Habitat assessments have been conducted by qualified biologists in the field on all 72 miles or 116 kilometers (i.e., 100 percent) of the rights-of-way in this county. About 3.3 miles (5.3 kilometers) of rights-of-way with encroached potential habitat were identified (Whitenton Group 2004c). This amounts to about 4.6 percent of the total right-of-way length. Potential habitat occurs in historically cleared rights-of-way where forest encroachment has advanced over a prolonged maintenance interval sufficient to develop structural attributes suitable for golden-cheeked warbler. In most cases, maintenance activities will be conducted in cleared rights-of-way; therefore, habitat modification is unlikely, although some clearing may be necessary due to forested encroachment from ingrowth of adjacent trees on the edge, and successional transition to forested vegetational cover within the existing rights-of-way. For some facilities, the addition of a second circuit would also necessitate the clearing of the full-encroached rights-of-way. Based on experience from on-the-ground pedestrian habitat assessments by qualified biologists, the Applicant believes that forested vegetational encroachment within the existing rights-of-way falls in the range of 10 to 50 percent. Combining these percentages, operation and maintenance activities would impact potential golden-cheeked warbler habitat within, at most, 2.3 percent (32 acres or 13 hectares) of existing electric facility rights-of-way in Hood County.

Johnson County. The Applicant currently has 160 miles (258 kilometers) or 3,103 acres (1,256 hectares) of existing electric facility rights-of-way in Johnson County. An estimated 1 to 3 acres (0.4 to 1 hectare) of potential golden-cheeked warbler habitat is within the rights-of-way for these existing electric transmission line facilities. Field-based pedestrian habitat assessments have been conducted by qualified biologists on all 160 miles or 258 kilometers (i.e., 100 percent) of the rights-of-way in this county. About 0.4 mile (0.6 kilometer) of rights-of-way with encroached potential habitat was identified (Whitenton Group 2004c). This amounts to about 0.2 percent of the total right-of-way length. Potential habitat occurs in historically cleared rights-of-way where forest encroachment has advanced over a prolonged maintenance interval sufficient to develop structural attributes suitable for golden-cheeked warbler. In most cases, maintenance activities will be conducted in cleared rights-of-way; therefore, habitat modification is unlikely, although some clearing may be necessary due to forested encroachment from ingrowth of adjacent trees on the edge and successional transition to forested vegetational cover within the existing rights-of-way. For some facilities, the addition of a second circuit would also necessitate the clearing of the full-encroached rights-of-way. Based on experience from on-the-ground pedestrian habitat assessments, the Applicant believes that forested vegetational encroachment within the existing rights-of-way falls in the range of 10 to 50 percent. Combining these percentages, operation and maintenance activities would impact potential golden-cheeked warbler habitat within, at most, 0.1 percent (3 acres or 1 hectare) of existing electric facility rights-of-way in Johnson County.

Somervell County. The Applicant currently has 21 miles (34 kilometers) or 407 acres (165 hectares) of existing electric facility rights-of-way in Somervell County. An estimated 2 to 8 acres (1 to 3 hectares) of potential golden-cheeked warbler habitat is within the rights-of-way for these existing electric

transmission line facilities. On-the-ground pedestrian habitat assessments have been conducted by qualified biologists on all 21 miles or 34 kilometers (i.e., 100 percent) of the rights-of-way in this county. About 0.8 mile (1.3 kilometers) of rights-of-way with encroached potential habitat was identified (Whitenton Group 2004c). This amounts to about 4 percent of the total right-of-way length. Potential habitat occurs in historically cleared rights-of-way where forest encroachment has advanced over a prolonged maintenance interval sufficient to develop structural attributes suitable for golden-cheeked warbler. In most cases, maintenance activities will be conducted in cleared rights-of-way; therefore, habitat modification is unlikely, although some clearing may be necessary due to forested encroachment from ingrowth of adjacent trees on the edge and successional transition to forested vegetational cover within, the existing rights-of-way. For some facilities, the addition of a second circuit would also necessitate the clearing of the full-encroached rights-of-way. Based on experience from on-the-ground pedestrian habitat assessments, the Applicant believes that forested vegetational encroachment within the existing rights-of-way falls in the range of 10 to 50 percent. Combining these percentages, operation and maintenance activities would impact potential golden-cheeked warbler habitat within, at most, 2 percent (8 acres or 3 hectares) of existing electric facility rights-of-way in Somervell County.

Recovery Region 3

Bell County. The Applicant currently has 241 miles (388 kilometers) or 4,674 acres (1,892 hectares) of existing electric facility rights-of-way in Bell County. An estimated 37 to 186 acres (15 to 75 hectares) of potential golden-cheeked warbler habitat is within the rights-of-way for these existing electric transmission line facilities. Based on on-the-ground pedestrian habitat assessments conducted in Bell and Bosque counties, the Applicant believes that about two percent of the rights-of-way could be within areas that qualify as potential habitat. Potential habitat occurs in historically cleared rights-of-way where forest encroachment has advanced over a prolonged maintenance interval sufficient to develop structural attributes suitable for golden-cheeked warbler. In most cases, maintenance activities will be conducted in cleared rights-of-way; therefore, habitat modification is unlikely, although some clearing may be necessary due to forested encroachment from ingrowth of adjacent trees on the edge and successional transition to forested vegetational cover within, the existing rights-of-way. Based on experience from on-the-ground pedestrian habitat assessments, the Applicant believes that forested vegetational encroachment falls in the range of 10 to 50 percent of its existing rights-of-way. Combining these percentages, operation and maintenance activities would impact potential golden-cheeked warbler habitat within, at most, 4 percent (186 acres or 75 hectares) of existing electric facility rights-of-way in Bell County.

Comanche County. The Applicant currently has 109 miles (175 kilometers) or 2,114 acres (856 hectares) of existing electric facility rights-of-way in Comanche County. An estimated 21 to 63 acres (9 to 26 hectares) of potential golden-cheeked warbler habitat is within the rights-of-way for these existing electric transmission line facilities. Field-based on-the-ground habitat assessments have been conducted by qualified biologists on 17 percent (i.e., 18 miles or 29 kilometers) of the rights-of-way in this county. No potential habitat was identified on the 18 miles (29 kilometers) of rights-of-way; however, based on the location of facilities in the county, the Applicant believes that between 1 and 3

percent (21 to 63 acres or 9 to 26 hectares) of existing rights-of-way may contain potential habitat. Therefore, operation and maintenance activities would impact potential golden-cheeked warbler habitat within, at most, three percent (63 acres or 26 hectares) of the existing electric facility rights-of-way in Comanche County.

Coryell County. The Applicant currently has 7 miles (11 kilometers) or 136 acres (55 hectares) of existing electric facility rights-of-way in Coryell County. An estimated 2 to 9 acres (1 to 4 hectares) of potential golden-cheeked warbler habitat is within the rights-of-way for these existing electric transmission line facilities. About 65 percent of the facilities fall within ecological areas that may contain potential golden-cheeked warbler habitat. However, based on on-the-ground pedestrian habitat assessments conducted by qualified biologists in Bell and Bosque counties, the Applicant believes that only about 20 percent of habitat in the rights-of-way within these ecological areas (i.e., about 10 percent or 14 acres [5.7 hectares] of the Applicant's existing Coryell County rights-of-way) could be within areas that qualify as potential habitat. Potential habitat would occur in historically cleared rights-of-way where forest encroachment has advanced over a prolonged maintenance interval sufficient to develop structural attributes suitable for golden-cheeked warbler. In most cases, maintenance activities will be conducted in cleared rights-of-way; therefore, habitat modification is unlikely, although some clearing may be necessary due to forested encroachment along the edge of, and transition to forested vegetational cover within, the existing rights-of-way. Based on experience from on-the-ground pedestrian habitat assessments conducted by qualified biologists, the Applicant believes that forested vegetational encroachment within the rights-of-way falls in the range of 10 to 50 percent of its existing rights-of-way. Combining these percentages, operation and maintenance activities would impact potential golden-cheeked warbler habitat within, at most, 6.5 percent (9 acres or 4 hectares) of existing electric facility rights-of-way in Coryell County.

For the remaining counties in Table 5-8a (Hill, McLennan, Palo Pinto, and Young), based on habitat assessments conducted by qualified biologists in various parts of the respective counties, the Applicant does not believe that any of its existing facilities are in the vicinity of golden-cheeked warbler habitat. For Hill County, on-the-ground pedestrian habitat assessments have been conducted on about 10 percent (i.e., 17 miles or 27 kilometers) of the rights-of-way. No potential habitat was encountered within any of the rights-of-way assessed. Based on the habitat assessments in the field and the location of the facilities, the Applicant has concluded that no potential habitat occurs in the vicinity of its existing facilities in this county.

5.2.8.3.2 *New Facilities*

The Applicant believes that between 1.5 and 465 acres (0.6 and 188 hectares) of potential habitat may be directly impacted as a result of constructing new facilities. This estimate is based on construction of 300 miles (483 kilometers) of new 345-kV electric transmission line that passes through potential habitat areas: 60 miles (97 kilometers) through Recovery Region 1, 90 miles (145 kilometers) through Recovery Region 2, 105 miles (169 kilometers) through Recovery Region 3, and 22.5 miles (37 kilometers) each

through recovery regions 4 and 5. At an assumed width of 160 feet (49 meters) this would result in 5,818 acres (2,355 hectares) of new rights-of-way with an estimated 0.03 to 8 percent of the new rights-of-way impacting potential habitat. These percentages are based on the lowest minimum percentage (Johnson County) and the highest maximum percentage (Bosque County) estimated for the Applicant's existing facilities. Since maximum take is being requested, at 8 percent, the assessment of potential direct take is 465 acres (188 hectares) (Table 5-8b). The Applicant believes that estimates of encroached potential habitat on existing rights-of-way established before the ESA or listing of many of the current protected species are representative of the amount of potential habitat that might be encountered on new rights-of-way.

As discussed above for operations and maintenance of existing facilities, an assessment of potential impacts to golden-cheeked warbler habitat was also conducted for new facilities by recovery region. Construction of new facilities is proposed in recovery regions 1, 2, 3, 4, and 5 within the proposed Permit Area. Existing facilities occur in recovery regions 1, 2, and 3, but not in recovery regions 4 and 5. The exact location is unknown for future electric transmission facilities to be constructed by covered activities in the proposed Permit Area. To better understand the potential impacts of covered activities on the recovery and survival of the species in the wild, while acknowledging this uncertainty, it was necessary to project potential future impacts to golden-cheeked warbler habitat by recovery region. The percentage of future facilities to be constructed in potential golden-cheeked warbler habitat was extrapolated by recovery region based on several factors: the anticipated impacts for existing facilities, the estimated habitat availability and distribution within the recovery region, and the Applicant's understanding of likely areas for expansion.

For each recovery region to be affected by construction of new facilities within the proposed Permit Area, the area of habitat expected to incur incidental take was compared to the estimated availability of golden-cheeked warbler habitat within that region. As previously mentioned, two datasets of comparable and appropriate spatial scale and extent to the recovery region boundaries and covered activities were consulted: one acquired from the NRCS Biological Opinion (Service 2004g) and the other from Morrison et al. (2010). Based on these data, the Applicant estimates that incidental take from direct impacts by covered activities for new facilities could range between 0.03 and 1.03 percent (Service 2004g) and 0.01 and 0.04 percent (Morrison et al. 2010) of potential golden-cheeked warbler habitat for each recovery region included in the proposed Permit Area (see Table 5-8b). Throughout the species' breeding range, these direct impacts would equate to from 0.01 (Morrison et al. 2010) to 0.04 percent (Service 2004g) of total suitable habitat. The Applicant believes that implementation of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this document, will minimize adverse direct impacts to the golden-cheeked warbler from construction of new electric facilities within the proposed Permit Area.

Table 5-8b. Acres (Hectares) of Potential Impact to Golden-Cheeked Warbler Habitat by Recovery Region for New Facilities

Facilities	Predicted % of Total Future Facilities	Miles (Kilometers) of Facilities ¹	Rights-of-Way Acres (Hectares) of Facilities ²	Assessment of Potential Habitat Availability and Potential Impacts from Covered Activities								
				Assessment of Take					from NRCS Biological Opinion (Service 2004g)			
				Acres (Hectares) of Potential Impact ³		Acres (Hectares) of Potential Habitat		% of Potential Habitat Impacted ⁴	Acres (Hectares) of Potential Habitat		% of Potential Habitat Impacted ⁴	
Recovery Region 1												
Future Direct				93	(38)			0.19				0.03
Future Indirect				349	(141)			0.71				0.12
Subtotal	20	60 (97)	1,164 (471)	442	(179)	49,222	(19,919) ⁵	0.90	280,783	(113,629)		0.15
Recovery Region 2												
Future Direct				140	(57)			1.03				0.04
Future Indirect				524	(212)			3.86				0.14
Subtotal	30	90 (145)	1,745 (706)	664	(269)	13,587	(5,498) ⁶	4.89	369,236	(149,425)		0.18
Recovery Region 3												
Future Direct				163	(66)			0.25				0.04
Future Indirect				611	(247)			0.95				0.15
Subtotal	35	105 (169)	2,036 (824)	774	(313)	64,304	(26,023) ⁷	1.20	414,427	(167,713)		0.19
Recovery Region 4												
Future Direct				35	(14)			0.04				0.01
Future Indirect				131	(53)			0.14				0.02
Subtotal	7.5	22.5 (36)	436 (176)	166	(67)	92,264	(37,338)	0.18	597,862	(241,946)		0.03
Recovery Region 5												
Future Direct				35	(14)			0.03				0.01
Future Indirect				131	(53)			0.09				0.02
Subtotal	7.5	22.5 (36)	436 (176)	166	(67)	138,394	(56,006)	0.12	628,790	(254,462)		0.03
Direct total				465	(188)			0.04				0.01
Indirect total				1,745	(706)			0.15				0.04
Total	100	300 (483)	5,818 (2,354)	2,210	(894)	1,178,051	(476,740) ⁸	0.19	4,148,138	(1,678,692)		0.05

¹Estimated total miles of facilities (electric transmission lines) within the distribution range of the golden-cheeked warbler.

²Estimated total right-of-way acreage of facilities within the distribution range of the golden-cheeked warbler based on 160-foot (49-meter)-wide rights-of-way.

³Estimated maximum acreage of impact to suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

⁴Based on maximum acreage of impact to suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

⁵Estimate of total potential habitat excludes Young County.

⁶Estimate of total potential habitat excludes Dallas County.

⁷Estimate of total potential habitat includes Lampasas County but excludes Comanche County.

⁸Includes all potential habitat, assessed according to respective reference, across all recovery regions, as established by the recovery plan.

Historically, most HCPs processed by the Service have suggested that indirect impacts affect golden-cheeked warblers up to 300 feet (91 meters) from a newly created edge. Using this as the basis, approximately 21,818 acres (8,833 hectares) would occur within 300 feet of both newly created edges in potential habitat areas upon clearing an approximate 160-foot (49-meter) right-of-way. Using the maximum of 8 percent noted above for direct impacts, the Applicant believes that 1,745 acres (706 hectares) of potential habitat may be indirectly impacted as a result of constructing new facilities (see Table 5-8b). Estimates assume that where direct impacts to potential habitat occur, the rights-of-way bisect suitable habitat and that habitats within 300 feet (91 meters) of both edges of the rights-of-way are also suitable for golden-cheeked warbler in entirety. Based on these estimates, adverse indirect impacts from construction of new facilities could potentially range between 0.09 and 3.86 percent (Service 2004g) and 0.02 and 0.15 percent (Morrison et al. 2010) of potential golden-cheeked warbler habitat for each recovery region included in the proposed Permit Area (see Table 5-8b). Throughout the species' breeding range, these indirect impacts would equate to from 0.04 (Morrison et al. 2010) to 0.15 percent (Service 2004g) of estimated total suitable habitat. The Applicant believes that implementation of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this document, will minimize adverse indirect impacts to the golden-cheeked warbler from construction of new electric facilities within the proposed Permit Area. In summary, the Applicant's total requested take of golden-cheeked warbler habitat for both existing and future facilities is 2,997 acres (1,213 hectares), or 0.07 percent (Morrison et al. 2010) to 0.25 percent (Service 2004g) of estimated available breeding habitat. The greatest impacts by area are anticipated in recovery regions 1, 2, and 3, with lower impacts expected in recovery regions 4 and 5. Based on areal estimates of golden-cheeked warbler habitat availability, the maximum percentage of habitat affected by the requested incidental take in any recovery region could be as high as 6.87 percent (Recovery Region 2; Service 2004g) or as low as 0.25 percent (recovery regions 1, 2, and 3; Morrison et al. 2010). Table 5-8c summarizes the potential impact to golden-cheeked warbler habitat by recovery region for covered activities under the requested permit.

5.2.9 Black-capped Vireo

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

- The existing primary threats to habitat used by the species would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
- The size of the black-capped vireo population in the proposed Permit Area would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).
- The recovery tasks or actions of the black-capped vireo recovery plan were furthered or achieved (beneficial effects – no adverse effects) or were precluded from being implemented or achieved (adverse effects).

5.2.9.1 Direct Impacts

As with the golden-cheeked warbler, loss of habitat from covered activities could result in adverse direct impacts to the breeding and foraging success of the black-capped vireo. This habitat loss could result in fragmentation of remaining habitat adjacent to the rights-of-way. A decrease in habitat quality could force some individuals to migrate from suitable habitat to less-suitable locations where the species' habitat may already be at its carrying capacity. The black-capped vireo occupies heterogeneous shrub habitat characterized by a patchy distribution of shrub clumps and thickets, with an average of 30 to 45 percent deciduous woody cover that allows light to reach ground level (Grzybowski 1995). Thus, clearing of habitat within the rights-of-way is unlikely to render the remaining habitat entirely unsuitable. New habitat could develop along the edge of the cleared rights-of-way. Black-capped vireos are known to utilize narrow, linear strips of brush vegetation along corridors such as transmission lines and roads (D. Green, PBS&J, pers. obs.).

Adherence to the avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document would minimize adverse direct impacts to the black-capped vireo from covered activities. Specific actions to reduce direct impacts to this species from covered activities include, but are not limited to, assessing habitat potential and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; limiting clearing of native vegetation, especially dense low-growing shrubs, to the minimum necessary to operate and maintain lines; performing covered activities, if within 300 feet (91 meters) of black-capped vireo habitat, outside of the breeding season, when practicable, and according to strict protocol to preclude impacts when impracticable; limiting clearing of access roads unless absolutely necessary; and trimming or topping taller trees adjacent to the rights-of-way to the minimum necessary amount required for compliance with National Safety Codes and removing such trees only when they qualify as danger trees. Overall, adverse direct impacts to the black-capped vireo resulting from covered activities are expected to be minor to moderate.

5.2.9.2 Indirect Impacts

As with the golden-cheeked warbler, indirect adverse impacts associated with habitat fragmentation include increased potential for predation, including predation by the imported red fire ant, increased brood parasitism, and competition or changes in the structure or composition of adjacent habitat, which may affect foraging activity. These impacts are not expected to be significant, however, and would not be expected to have a significant negative impact on local or regional populations of the black-capped vireo. If the brush vegetation within newly created transmission line rights-of-way is allowed to revegetate over a sufficient duration to develop suitable habitat conditions, it would be of potential use to this species, which often uses transmission line rights-of-way for foraging and nesting (D. Green, PBS&J, pers. obs.). Habitat creation through disturbance related to the covered activities would have a beneficial effect. However, areas of newly created vireo habitat along the edge of new rights-of-way may be subject to

increased predation from species such as the blue jay and brood parasitism from the brown-headed cowbird—adverse effects. Herbicides and pesticides may affect prey availability for this species. Increased browse by goats, deer, or exotic animals due to habitat fragmentation caused by covered activities may also indirectly affect black-capped vireo by removing vegetative strata at lower heights required by the species for nesting.

Based on the nature of potential impacts to the species from covered activities, the Applicant believes that adverse indirect impacts to the black-capped vireo will be minimized by the implementation of avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document. Specific actions to reduce indirect impacts to this species from covered activities include, but are not limited to, assessing habitat potential and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; minimizing soil disturbance by covered activities and, where disturbance occurs, using native soils for backfill and revegetating with native vegetation to reduce the risk of imported red fire ant introduction; limiting clearing of native vegetation, especially dense low-growing shrubs, to the minimum necessary to operate and maintain lines; performing covered activities outside of the breeding season if within 300 feet (91 meters) of black-capped vireo habitat, when practicable, and in accordance with protocol to preclude impacts when impracticable; limiting the clearing of access roads outside of the rights-of-way to only where absolutely necessary; trimming or topping taller trees adjacent to the rights-of-way to the minimum necessary amount required for compliance with National Safety Codes and removing such trees only when they qualify as danger trees; following guidelines for preventing the spread of oak wilt when clearing or trimming trees within counties where oak wilt is known to occur; and minimizing herbicide and pesticide use, to the maximum extent practicable, and using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence), and complying with Service (2004e) guidelines for pesticide application. Overall, adverse indirect impacts to the black-capped vireo resulting from covered activities are expected to be minor.

5.2.9.3 Assessment of Take

5.2.9.3.1 Existing Facilities

The Applicant currently has 3,631 miles (5,846 kilometers) totaling 70,419 acres (28,510 hectares) of existing electric facility rights-of-way within the range of the black-capped vireo in the proposed Permit Area. The Applicant estimates that 1,292 acres (523 hectares) of potential black-capped vireo habitat could be impacted by the operation and maintenance of the existing electric facilities within the proposed Permit Area. As recommended by the Service (Omar Bocanegra, pers. comm. to G. Newgord, PBS&J, 2010) Permit Area counties have been grouped by recovery regions and recovery regions have been conformed to county boundaries (Service 2009c) for purposes of take assessment.

In the recovery plan for the black-capped vireo, recovery criteria for delisting the species are not provided due to confounding uncertainties on the biology and status (i.e., distribution and abundance) of the species at that time. Criteria are listed, however, for consideration of downlisting from endangered to threatened and include numerous standards: 1) all existing populations must be protected and maintained; 2) at least one viable breeding population must exist in each of the six regions, established as Oklahoma, Mexico, and four of the six designated Texas regions; 3) sufficient and sustainable area and habitat on the winter range must exist to support the breeding populations outlined above; and 4) all of these criteria must be maintained for at least five consecutive years and available data support their continued maintenance (Service 1991b). The definition of a viable population for the black-capped vireo, as established within the recovery plan, is from 500 to 1,000 breeding pairs, with the median value of 750 pairs achieved for at least 50 percent of the target viable populations, though this estimate may differ regionally and with further research (Service 1991b).

Covered activities for existing facilities within the proposed Permit Area will occur in Recovery Regions 1, 2, 4, and 6, in addition to Midland, Reagan, Mitchell, and Upland counties, which are excluded from the six Texas recovery regions but within which breeding black-capped vireos have been observed. Construction of new facilities under the covered activities is also proposed in Recovery Region 3. As such, of the six Texas recovery regions, Recovery Region 5 is outside of the proposed Permit Area and will not be affected by covered activities.

At the time the recovery plan was developed for the black-capped vireo, the amount and distribution of suitable breeding habitat was an important factor in citing the species' endangerment, though the exact values of these parameters were unknown. Little development has been achieved to better define these estimates at the landscape scale, and consequently, the exact extent of suitable black-capped vireo habitat within each recovery region and across the species' breeding range is not known with certainty (Service 2007). Extensive roadside surveys of 53 counties between July 1996 and August 1998 were performed within the species breeding range to assess black-capped vireo habitat availability and occupancy along Texas public roadways in counties with known or potential black-capped vireo occupancy (Maresh and Rowell 2000). Based on U.S. Geological Survey topographic maps, these roadside surveys were available, and recent site visits were unavailable, the area of potential black-capped vireo habitat was extrapolated for 55 counties (Service 2004g). Since the spatial scale needed to assess potential impacts from covered activities to black-capped vireos for existing facilities is at the level of recovery regions that were conformed to county boundaries, the estimated potentially suitable black-capped vireo habitat by county was used to evaluate the percentage of which will be impacted from incidental take by covered activities for existing facilities and then extended to estimate impacts by recovery region (Table 5-9a). An estimate of potential habitat was not available for 13 counties within the proposed Permit Area, and habitat within these counties did not contribute to calculated recovery region totals. As such, the percent of potential habitat affected by incidental take within these recovery regions should be overestimated. However, errors inherent in the assessment of potential habitat availability may limit the reliability and utility of the data for evaluating impacts of the covered activities proposed under this HCP on the black-capped vireo (Service 2007).

Table 5-9a. Acres (Hectares) of Potential Impact to Black-Capped Vireo Habitat by Recovery Region for Existing Facilities

Facilities	County	Miles (Kilometers) ¹ of Facilities		Rights-of-Way Acres (Hectares) ² of Facilities		Acres (Hectares) of Potential Impact ³		from NRCS Biological Opinion by Service (2004g)		% of Potential Habitat in Recovery Region Affected by Incidental Take
								Acres (Hectares) of Potential Habitat		
RECOVERY REGION 1										
Existing	Cooke	86	(138)	1,668	(675)	0		N/A		
	Dallas	516	(831)	10,007	(4,051)	0		900	(364)	
	Denton	126	(203)	2,444	(989)	0		N/A		
	Eastland	99	(159)	1,920	(777)	34	(14)	N/A		
	Erath	108	(174)	2,095	(848)	8	(3)	15,060	(6,095)	
	Grayson	209	(336)	4,053	(1,641)	0		N/A		
	Hill	179	(288)	3,472	(1,406)	0		N/A		
	Hood	72	(116)	1,396	(565)	0		3,147	(1,274)	
	Jack	91	(147)	1,765	(715)	177	(72)	N/A		
	Johnson	160	(257)	3,103	(1,256)	0		0		
	Montague	29	(47)	562	(228)	0		100	(40)	
	Palo Pinto	72	(116)	1,396	(565)	0		11,176	(4,523)	
	Parker	174	(280)	3,375	(1,366)	214	(87)	963	(390)	
	Shackelford	37	(60)	718	(291)	0		N/A		
	Stephens	111	(179)	2,153	(872)	129	(52)	7,631	(3,088)	
	Wise	127	(204)	2,463	(997)	123	(50)	N/A		
Subtotal						685	(277)	38,977	(15,780)	
Additional known potential habitat for recovery region								N/A		
Total known existing habitat for recovery region						685	(277)	38,977	(15,780) ⁴	1.75

Table 5-9a (Cont'd)

Facilities	County	Miles (Kilometers) ¹ of Facilities		Rights-of-Way Acres (Hectares) ² of Facilities		Acres (Hectares) of Potential Impact ³		from NRCS Biological Opinion by Service (2004g)		% of Potential Habitat in Recovery Region Affected by Incidental Take
								Acres (Hectares) of Potential Habitat		
RECOVERY REGION 2										
Existing	Bell	241	(388)	4,674	(1,892)	211	(85)	11,004	(4,453)	
	Bosque	44	(71)	853	(345)	61	(25)	7,594	(3,073)	
	Brown	79	(127)	1,532	(620)	47	(19)	36,235	(14,664)	
	Comanche	109	(175)	2,114	(856)	24	(10)	10,999	(4,451)	
	Coryell	7	(11)	136	(55)	16	(6)	4,486	(1,815)	
	McLennan	226	(364)	4,383	(1,774)	0		N/A		
	Mills	19	(31)	368	(149)	11	(4)	1,596	(646)	
	Somervell	21	(34)	407	(165)	0		1,198	(485)	
						370	(150)	73,112	(29,600)	
Subtotal										
Additional known potential habitat for recovery region								62,097	(25,140)	
Total known existing habitat for recovery region								135,209	(54,740) ⁵	0.27
RECOVERY REGION 4										
Existing	Nolan	136	(219)	2,638	(1,068)	237	(96)	37,922	(15,353)	
	Taylor	19	(31)	368	(149)	0		9,761	(3,952)	
Subtotal										
Additional known potential habitat for recovery region								75,070	(30,393)	
Total known existing habitat for recovery region								122,753	(49,698)	0.19

Table 5-9a (Cont'd)

Facilities	County	Miles (Kilometers) of Facilities		Rights-of-Way Acres (Hectares) of Facilities ²		Acres (Hectares) of Potential Impact ³		from NRCS Biological Opinion by Service (2004g)		
								Acres (Hectares) of Potential Habitat		% of Potential Habitat in Recovery Region Affected by Incidental Take
RECOVERY REGION 6										
Existing	Pecos	32	(52)	621	(251)	0		750	(304)	
Subtotal						0		750	(304)	
Additional known potential habitat for recovery region								1,100	(445)	
Total known existing habitat for recovery region								1,850	(749) ⁶	0
NOT INCLUDED IN RECOVERY REGIONS										
Existing	Midland	220	(354)	4,267	(1,728)	0		N/A		
	Mitchell	221	(356)	4,286	(1,735)	0		N/A		
	Reagan	9	(14)	175	(71)	0		N/A		
	Upton	52	(84)	1,008	(408)	0		N/A		
Subtotal		502	(203)	9,736	(3,940)	0	0	N/A		0
Total Existing		3,631	(5,846)	70,419	(28,510)	1,292	(523)	1,450,438	(587,222) ⁷	0.09

¹Estimated total miles of facilities (electric transmission lines) within the distribution range of the black-capped vireo.

²Estimated total right-of-way acreage of facilities within the distribution range of the black-capped vireo based on 160-foot (49-meter)-wide rights-of-way.

³Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

⁴Estimated acres of potential habitat does not include Cooke, Denton, Eastland, Grayson, Hill, Jack, Shackelford, or Wise counties.

⁵Estimated acres of potential habitat does not include McLennan County.

⁶Estimated acres of potential habitat does not include Jeff Davis County.

⁷Estimated total black-capped vireo habitat throughout Texas breeding range (Service 2004g).

Note: Numbers depicted are rounded and as such apparent discrepancies with totals are due to rounding errors of subtotals.

Given that the extent of these limitations is unknown and unquantifiable without further data, the Applicant estimates that based on these data, between 0.19 and 1.75 percent (Service 2004g) of potential black-capped vireo habitat could be impacted for each recovery region included in the proposed Permit Area (see Table 5-9a). The basis for these estimates is discussed below. Because of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this document, the Applicant believes that indirect impacts to the black-capped vireo from operation and maintenance of existing facilities will be minimized.

Recovery Region 1

Eastland County. The Applicant currently has 99 miles (159 kilometers) or 1,920 acres (777 hectares) of existing electric facility rights-of-way in Eastland County. An estimated 19 to 34 acres (8 to 14 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. About 40 percent of the facilities fall within ecological areas that may contain potential black-capped vireo habitat. However, based on on-the-ground pedestrian habitat assessments conducted by qualified biologists in Comanche and Erath counties, the Applicant believes that only about 5 percent of the habitat within rights-of-way in these ecological areas (i.e., about 2 percent or 38 acres [15 hectares] of the Applicant's existing Eastland County rights-of-way) could be within areas that qualify as potential habitat. Potential habitat would occur in historically cleared rights-of-way where forest encroachment has advanced over a prolonged maintenance interval sufficient to develop structural attributes suitable for black-capped vireo. In many cases, rights-of-way maintenance practices have led to potential habitat encroachment well into existing rights-of-way because black-capped vireo habitat does not usually impose a threat to the Applicant's facilities. While the potential habitat does not pose a threat, however, it may need to be cleared for such activities as emergency response, facility rebuilds or reconductoring operations. Based on historical rights-of-way maintenance practices and experience from field-based pedestrian habitat assessments conducted by qualified biologists, the Applicant believes that scrub encroachment falls in the range of 50 to 90 percent of its existing rights-of-way. Combining the above percentages, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, 1.8 percent (34 acres or 14 hectares) of existing electric facility rights-of-way in Eastland County.

Erath County. The Applicant currently has 108 miles (174 kilometers) or 2,095 acres (848 hectares) of existing electric facility rights-of-way in Erath County. An estimated 4 to 8 acres (2 to 3 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. Potential habitat occurs in historically cleared rights-of-way where forest encroachment has advanced through ingrowth and successional transition to forested vegetational cover over a prolonged maintenance interval sufficient to develop structural attributes suitable for black-capped vireo. Pedestrian habitat assessments have been conducted in the field by qualified biologists on 46 percent (i.e., 50 miles or 80 kilometers) of the rights-of-way in this county. About 3.8 acres (1.5 hectares) of encroached potential habitat were identified on 50 miles (80 kilometers) of rights-of-way. Extrapolation

of this percentage (approximately 0.4 percent) to the rest of the right-of-way mileage in this county results in a maximum of 8 acres (3 hectares). If one assumes the observed acreage as the minimum and the extrapolated acreage as the maximum, the range of potential habitat within existing rights-of-way for this county is 4 to 8 acres (2 to 3 hectares). Therefore, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, 0.4 percent (8 acres or 3 hectares) of the existing electric facility rights-of-way in Erath County. It should be noted that black-capped vireos were not observed during presence/absence surveys conducted in 2004 on about 0.5 mile (0.8 kilometer) of rights-of-way (Whitenton Group 2004a).

Jack County. The Applicant currently has 91 miles (147 kilometers) or 1,765 acres (715 hectares) of existing electric facility rights-of-way in Jack County. An estimated 35 to 177 acres (14 to 72 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. Based on on-the-ground pedestrian habitat assessments in the western half of the county and vehicle reconnaissance in the eastern half of the county by qualified biologists, the Applicant believes that about 20 percent of the rights-of-way could be within areas that qualify as potential habitat. Potential habitat occurs in historically cleared rights-of-way where forest encroachment has advanced through ingrowth and successional transition to forested vegetational cover over a prolonged maintenance interval sufficient to develop structural attributes suitable for black-capped vireo. In most cases, maintenance activities will be conducted in cleared rights-of-way; therefore, the modification of habitat is unlikely although some clearing may be necessary due to scrub encroachment into existing rights-of-way. Based on experience from field-based pedestrian habitat assessments, the Applicant believes that scrub encroachment falls in the range of 10 to 50 percent of its existing rights-of-way. Combining the above percentages, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, 10 percent (177 acres or 72 hectares) of existing electric facility rights-of-way in Jack County.

Parker County. The Applicant currently has 174 miles (280 kilometers) or 3,375 acres (1,366 hectares) of existing electric facility rights-of-way in Parker County. An estimated 32 to 214 acres (13 to 87 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. On-the-ground habitat assessments have been conducted in the field by qualified biologists on 15 percent (i.e., 26 miles or 42 kilometers) of the rights-of-way in this county (Whitenton Group 2004c). About 32 acres (13 hectares) of encroached potential habitat were identified on 26 miles (42 kilometers) of rights-of-way. Extrapolation of this percentage (approximately 6.3 percent) to the rest of the right-of-way mileage in this county results in a maximum of 214 acres (87 hectares). If one assumes the observed acreage as the minimum and the extrapolated acreage as the maximum, between 32 and 214 acres (13 and 87 hectares) of potential black-capped vireo habitat would be impacted by operation and maintenance of the existing electric facilities in Parker County. Therefore, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, 214 acres (87 hectares) of the existing electric facility rights-of-way in Parker County.

Stephens County. The Applicant currently has 111 miles (179 kilometers) or 2,153 acres (872 kilometers) of existing electric facility rights-of-way in Stephens County. An estimated 22 to 129 acres (9 to 52 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. About 90 percent of the facilities fall within areas that may contain potential black-capped vireo habitat. Potential habitat occurs in historically cleared rights-of-way where scrub encroachment has advanced through ingrowth and successional transition to woody vegetational cover over a prolonged maintenance interval sufficient to develop structural attributes suitable for black-capped vireo. In many cases, rights-of-way maintenance practices have led to potential habitat encroachment well into existing rights-of-way because black-capped vireo habitat does not usually impose a threat to the Applicant's facilities. While the potential habitat does not pose a threat, however, it may need to be cleared for such activities as emergency response, facility rebuilds, or reconductoring operations. Based on historical rights-of-way maintenance practices and experience from on-the-ground pedestrian habitat assessments in Parker County (Whitenton Group 2004c), the Applicant believes that potential habitat acreage falls in the range of 1 to 6 percent, or 22 to 129 acres (9 to 52 hectares), of its existing rights-of-way. Therefore, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, 6 percent (129 acres or 52 hectares) of the existing electric facility rights-of-way in Stephens County.

Wise County. The Applicant currently has 127 miles (204 kilometers) or 2,463 acres (997 hectares) of existing electric facility rights-of-way in Wise County. An estimated 25 to 123 acres (10 to 50 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. Based on habitat assessments conducted by qualified biologists in the eastern third of the county and vehicle reconnaissance in the remaining portions of the county, the Applicant believes that about 10 percent of the rights-of-way could be within areas that qualify as potential habitat. Potential habitat would occur in historically cleared rights-of-way where scrub encroachment has advanced through ingrowth and successional transition to woody vegetational cover over a prolonged maintenance interval sufficient to develop structural attributes suitable for black-capped vireo. In most cases, maintenance activities will be conducted in cleared rights-of-way; therefore, the modification of habitat is unlikely although some clearing may be necessary due to scrub encroachment into existing rights-of-way. Based on experience from on-the-ground pedestrian habitat assessments, the Applicant believes that scrub encroachment falls in the range of 10 to 50 percent of its existing rights-of-way. Combining the above percentages, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, 5 percent (123 acres or 50 hectares) of existing electric facility rights-of-way in Wise County.

Recovery Region 2

Bell County. The Applicant currently has 241 miles (388 kilometers) or 4,674 acres (1,892 hectares) of existing electric facility rights-of-way in Bell County. An estimated 117 to 211 acres (47 to 85 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. About 40 percent of the facilities fall within the western half of Bell County and thus in

ecological areas that may contain potential black-capped vireo habitat. However, based on on-the-ground pedestrian habitat assessments conducted by qualified biologists in Bell and Bosque counties, the Applicant believes that only about 13 percent of habitat within the rights-of-way in these ecological areas (i.e., about 5.2 percent or 243 acres [98 hectares] of the Applicant's existing Bell County rights-of-way) could be within areas that qualify as potential habitat. Potential habitat would occur in historically cleared rights-of-way where scrub encroachment has advanced through ingrowth and successional transition to woody vegetational cover over a prolonged maintenance interval sufficient to develop structural attributes suitable for black-capped vireo. In many cases, rights-of-way maintenance practices have led to potential habitat encroachment well into existing rights-of-way because black-capped vireo habitat does not usually impose a threat to the Applicant's facilities. While the potential habitat does not pose a threat, however, it may need to be cleared for such activities as emergency response, facility rebuilds or reconducting operations. Based on historical rights-of-way maintenance practices and experience from field-based pedestrian habitat assessments, the Applicant believes that scrub encroachment falls in the range of 50 to 90 percent of its existing rights-of-way. Combining these percentages, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, 4.7 percent (211 acres or 85 hectares) of existing electric facility rights-of-way in Bell County.

Bosque County. The Applicant currently has 44 miles (71 kilometers) or 853 acres (345 hectares) of existing electric facility rights-of-way in Bosque County. An estimated 28 to 61 acres (11 to 25 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. On-the-ground habitat assessments have been conducted in the field by qualified biologists on 45 percent (i.e., 20 miles or 32 kilometers) of the rights-of-way in this county. About 28 acres (11 hectares) of encroached potential habitat were identified on 20 miles (32 kilometers) of rights-of-way. Extrapolation of this percentage (approximately 7 percent) to the rest of the right-of-way mileage in this county results in a maximum of 61 acres (25 hectares). If one assumes the observed acreage as the minimum and the extrapolated acreage as the maximum, the range for this county is 28 to 61 acres (11 to 25 hectares). Therefore, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, about 7 percent (61 acres or 25 hectares) of the existing electric facility rights-of-way in Bosque County. It should be noted that no black-capped vireos were observed during presence/absence surveys conducted in 2004 on about 3 miles (5 kilometers) of rights-of-way (Whitenton Group 2004b).

Brown County. The Applicant currently has 79 miles (127 kilometers) or 1,532 acres (620 hectares) of existing electric facility rights-of-way in Brown County. An estimated 38 to 47 acres (15 to 19 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. Field-based pedestrian habitat assessments have been conducted on 81 percent (i.e., 64 miles or 103 kilometers) of the rights-of-way in this county. About 38 acres (15 hectares) of encroached potential habitat were identified on 64 miles (103 kilometers) of rights-of-way. Extrapolation of this percentage (approximately 3 percent) to the rest of the right-of-way mileage in this county results in a maximum of 47 acres (19 hectares). If one assumes the observed acreage as the minimum and the

extrapolated acreage as the maximum, the range for this county is 38 to 47 acres (15 to 19 hectares). Therefore, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, about 3 percent (47 acres or 19 hectares) of the existing electric facility rights-of-way in Brown County.

Comanche County. The Applicant currently has 109 miles (175 kilometers) or 2,114 acres (856 hectares) of existing electric facility rights-of-way in Comanche County. An estimated 4 to 24 acres (2 to 10 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. On-the-ground pedestrian habitat assessments have been conducted by qualified biologists on 17 percent (i.e., 18 miles or 29 kilometers) of the rights-of-way in this county. About 4 acres (2 hectares) of encroached potential habitat were identified on 18 miles (29 kilometers) of rights-of-way. Extrapolation of this percentage (approximately 1 percent) to the rest of the right-of-way mileage in this county results in a maximum of 24 acres (10 hectares). If one assumes the observed acreage as the minimum and the extrapolated acreage as the maximum, the range for this county is 4 to 24 acres (2 to 10 hectares). Therefore, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, about 1 percent (24 acres or 10 hectares) of the existing electric facility rights-of-way in Comanche County.

Coryell County. The Applicant currently has 7 miles (11 kilometers) or 136 acres (55 hectares) of existing electric facility rights-of-way in Coryell County. An estimated 9 to 16 acres (4 to 6 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. About 65 percent of the facilities fall within ecological areas that may contain potential black-capped vireo habitat. However, based on habitat assessments conducted in the field by qualified biologists in Bell and Bosque counties, the Applicant believes that only about 20 percent of the rights-of-way in these ecological areas (i.e., about 13 percent or 18 acres [7 hectares] of the Applicant's existing Coryell County rights-of-way) could be within areas that qualify as potential habitat. Potential habitat would occur in historically cleared rights-of-way where scrub encroachment has advanced through ingrowth and successional transition to woody vegetational cover over a prolonged maintenance interval sufficient to develop structural attributes suitable for black-capped vireo. In many cases, rights-of-way maintenance practices have led to potential habitat encroachment well into existing rights-of-way because black-capped vireo habitat does not usually impose a threat to the Applicant's facilities. While the potential habitat does not pose a threat, however, it may need to be cleared for such activities as emergency response, facility rebuilds or reconductoring operations. Based on historical rights-of-way maintenance practices and experience from on-the-ground pedestrian habitat assessments, the Applicant believes that scrub encroachment falls in the range of 50 to 90 percent of its existing rights-of-way. Combining these percentages, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, 11.7 percent (16 acres or 6 hectares) of existing electric facility rights-of-way in Coryell County.

Mills County. The Applicant currently has 19 miles (31 kilometers) or 368 acres (149 hectares) of existing electric facility rights-of-way in Mills County. An estimated 4 to 11 acres (2 to 4 hectares) of

potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. One-hundred percent of the facilities fall within ecological areas that may contain potential black-capped vireo habitat. Potential habitat would occur in historically cleared rights-of-way where scrub encroachment has advanced through ingrowth and successional transition to woody vegetational cover over a prolonged maintenance interval sufficient to develop structural attributes suitable for black-capped vireo. In many cases, rights-of-way maintenance practices have led to potential habitat encroachment well into existing rights-of-way because black-capped vireo habitat does not usually impose a threat to the Applicant's facilities. While the potential habitat does not pose a threat, however, it may need to be cleared for such activities as emergency response, facility rebuilds or reconductoring operations. Based on historical rights-of-way maintenance practices and experience from on-the-ground pedestrian habitat assessments in Brown County, the Applicant believes that scrub encroachment qualifying as potential black-capped vireo habitat falls in the range of 1 to 3 percent, or 4 to 11 acres (2 to 4 hectares), of its existing rights-of-way. Therefore, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, about 3 percent (11 acres or 4 hectares) of the existing electric facility rights-of-way in Mills County.

Recovery Region 4

Nolan County. The Applicant currently has 136 miles (219 kilometers) or 2,638 acres (1,068 hectares) of existing electric facility rights-of-way in Nolan County. An estimated 26 to 237 acres (11 to 96 hectares) of potential black-capped vireo habitat is within the rights-of-way for these existing electric transmission line facilities. Based on habitat assessments conducted by qualified biologists in the northern third of the county and vehicle reconnaissance in the remaining portions of the county, the Applicant believes that about 10 percent of the rights-of-way could be within areas that qualify as potential habitat. In most cases, maintenance activities will be conducted in cleared rights-of-way; therefore, the modification of habitat is unlikely although some clearing may be necessary due to scrub encroachment into existing rights-of-way. Based on experience from on-the-ground pedestrian habitat assessments and vehicle reconnaissance, the Applicant believes that scrub encroachment falls in the range of 10 to 90 percent of its existing rights-of-way. Combining the above percentages, operation and maintenance activities would impact potential black-capped vireo habitat within, at most, 9 percent (237 acres or 96 hectares) of existing electric facility rights-of-way in Nolan County.

Proposed Permit Area Counties with No Anticipated Impacts

For the remaining counties in Table 5-9a, based on on-the-ground pedestrian habitat assessments in various parts of the respective counties, the Applicant does not believe that any of its existing facilities are in the vicinity of black-capped vireo habitat. For Hill County, habitat assessments have been conducted in the field by qualified biologists on about 10 percent (i.e., 17 miles or 27 kilometers) of the rights-of-way. No potential habitat was encountered on any of the rights-of-way assessed. Based on the habitat assessments in the field and the location of the facilities in this county, the Applicant has concluded that no potential habitat is located in the vicinity of its facilities. On-the-ground pedestrian habitat

assessments have been conducted by qualified biologists on all 72 miles (116 kilometers) of the rights-of-way in Hood County and on all 21 miles (34 kilometers) of the rights-of-way in Somervell County. No potential habitat for the black-capped vireo was observed (Whitenton Group 2004c). The Applicant currently has 32 miles (51 kilometers) or 621 acres (251 hectares) of existing electric facility rights-of-way in Pecos County, the only county within the proposed Permit Area in Recovery Region 6. Based on on-the-ground pedestrian habitat assessments conducted by qualified biologists for existing facilities in this county, the Applicant does not believe that any suitable black-capped vireo habitat exists within existing rights-of-way.

5.2.9.3.2 New Facilities

The Applicant believes that between 15 and 931 acres (6 and 377 hectares) of potential habitat may be directly impacted as a result of constructing new facilities. This estimate is based on construction of 400 miles (644 kilometers) of new 345-kV electric transmission line that passes through potential habitat areas. This would result in 7,758 acres (3,141 hectares) of new rights-of-way with an estimated 0.2 to 12 percent of the new rights-of-way impacting potential habitat. These percentages are based on the lowest minimum percentage (Comanche County) and highest maximum percentage (Coryell County) estimated by county for the Applicant's existing facilities. Since maximum take is being requested, at 12 percent this would be 931 acres (377 hectares) of direct take (Table 5-9b). The Applicant believes that estimates of encroached potential habitat on existing rights-of-way established before the ESA or listing of many of the current protected species are representative of the amount of potential habitat that might be encountered on new rights-of-way.

As discussed above for operations and maintenance of existing facilities, an assessment of potential impacts to black-capped vireo habitat was also conducted for new facilities by recovery region. Construction of new facilities is proposed in Recovery Regions 1, 2, 4, and 6 within the proposed Permit Area. The exact location is unknown for future electric transmission facilities to be constructed by covered activities in the proposed Permit Area, although general locations are known for several facilities. To better understand the potential impacts of covered activities on the recovery and survival of the species in the wild, while acknowledging this uncertainty, it was necessary to project potential future impacts to black-capped vireo habitat by recovery region. The percentage of future facilities to be constructed in potential black-capped vireo habitat was extrapolated by recovery region based on several factors: the anticipated impacts for existing facilities, the estimated habitat availability and distribution within the recovery region, and the Applicant's understanding of likely areas for expansion.

For each recovery region to be affected by construction of new facilities within the proposed Permit Area, the area of habitat expected to incur incidental take was compared to the estimated availability of black-capped vireo habitat within that region. As previously mentioned, estimates of existing habitat by recovery region were based on U.S. Geological Survey topographic maps, roadside surveys where available, and recent site visits where unavailable, and extrapolated for 55 counties (Service 2004g). Since the spatial scale needed to assess potential impacts from covered activities to black-capped vireos

for existing facilities is at the level of recovery regions that were conformed to county boundaries, the estimated potentially suitable black-capped vireo habitat by county was used to evaluate the percentage of which will be impacted from incidental take by covered activities for new facilities and then extended to estimate impacts by recovery region (see Table 5-9b).

Based on these data, the Applicant estimates that incidental take of black-capped vireo habitat from direct impacts by covered activities for new facilities could range between 0.19 and 2.51 percent (Service 2004g) of potential black-capped vireo habitat for each recovery region included in the proposed Permit Area (see Table 5-9b). The Applicant believes that implementation of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this document, will minimize adverse direct impacts to the black-capped vireo from construction of new electric facilities within the proposed Permit Area.

Historically, most HCPs processed by the Service have suggested that indirect impacts affect black-capped vireos up to 300 feet (91 meters) from a newly created edge. Using this as the basis, approximately 29,092 acres (11,778 hectares) would occur within 300 feet (91 meters) of both newly created edges in potential habitat areas. Using the maximum of 12 percent noted above for direct impacts, the Applicant believes that 3,491 acres (1,413 hectares) of potential habitat may be indirectly impacted as a result of constructing new facilities (see Table 5-9b). Estimates assume that where direct impacts to potential habitat occur, habitats within 300 feet (91 meters) of both edges of the rights-of-way are potentially suitable for black-capped vireo in entirety. Based on these estimates, construction of new facilities could potentially indirectly impact between 0.90 and 9.43 percent (Service 2004g) of potential black-capped vireo habitat for each recovery region included in the proposed Permit Area (see Table 5-9b).

The Applicant believes that implementation of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this document, will minimize indirect impacts to the black-capped vireo from construction of new electric facilities within the proposed Permit Area.

In summary, the Applicant's total requested take of black-capped vireo habitat for both existing and future facilities is 5,714 acres (2,313 hectares), or 0.39 percent (Service 2004g) of estimated available breeding habitat. The greatest impacts by area are anticipated in recovery regions 1, 2, and 3, with lower impacts expected in Recovery Region 6. Based on areal estimates of black-capped vireo habitat availability by recovery region, the maximum percentage of habitat affected by the requested incidental take in any recovery region could be as high as 11.95 percent (Recovery Region 6) and the minimum as low as 1.42 percent (Recovery Region 2). However, these calculations should be interpreted with caution given the caveats inherent to the survey methods used by the NRCS (cited in Service [2004g]), the absence of comparable and more recent surveys, and recent evidence supporting greater habitat availability (Service 2007). Table 5-9c summarizes the potential impact to black-capped vireo habitat by recovery region for covered activities under the requested permit.

Table 5-9b. Acres (Hectares) of Potential Impact to Black-Capped Vireo Habitat by Recovery Region for New Facilities

Facilities	Estimated % of Future Facilities in Potential Habitat	Miles (Kilometers) of Facilities ¹		Rights-of-Way Acres (Hectares) of Facilities ²		Acres (Hectares) of Potential Impact ³		from NRCS Biological Opinion (Service 2004g)		% of Habitat Affected by Incidental Take
								Acres (Hectares) of Black-Capped Vireo Habitat		
DIRECT IMPACTS										
Recovery Region 1										
Future Known	8	32	(52)	621	(251)	74	(30)			0.19
Predicted Future Additional	17	68	(109)	1,319	(534)	158	(64)			0.41
Recovery Region 1 Total	25	100	(161)	1,939	(785)	233	(94)	38,977	(15,780) ⁴	0.60
Recovery Region 2										
Future Known	26	104	(167)	2,017	(817)	242	(98)			0.18
Predicted Future Additional	9	36	(58)	698	(283)	84	(34)			0.06
Recovery Region 2 Total	35	140	(225)	2,715	(1099)	326	(132)	135,209	(54,740) ⁵	0.24
Recovery Region 4										
Future Known	14	56	(90)	1,086	(440)	130	(53)			0.11
Predicted Future Additional	21	84	(135)	1,629	(660)	195	(79)			0.08
Recovery Region 4 Total	35	140	(225)	2,715	(1099)	326	(132)	122,753	(49,698)	0.19
Recovery Region 6										
Future Known	0		0		0		0			0
Predicted Future Additional	5	20	(32)	388	(157)	47	(19)			2.51
Recovery Region 6 Total	5	20	(32)	388	(157)	47	(19)	1,850	(749) ⁶	2.51
Direct Total	100	400	(644)	7,758	(3,141)	931	(377)	1,450,438	(587,222) ⁷	0.06

Table 5-9b (Cont'd)

Facilities	Estimated % of Future Facilities in Potential Habitat	Miles (Kilometers) of Facilities ¹		Rights-of-Way Acres (Hectares) of Facilities ²		Acres (Hectares) of Potential Impact ³		from NRCS Biological Opinion (Service 2004g)		
INDIRECT IMPACTS										
Recovery Region 1										
Future Known	8	32	(52)	621	(251)	279	(113)			0.72
Predicted Future Additional	17	68	(109)	1,319	(534)	593	(240)			1.52
Recovery Region 1 Total	25	100	(161)	1,939	(785)	873	(353)	38,977	(15,780) ⁴	2.24
Recovery Region 2										
Future Known	26	104	(167)	2,017	(817)	908	(368)			0.67
Predicted Future Additional	9	36	(58)	698	(283)	314	(127)			0.23
Recovery Region 2 Total	35	140	(225)	2,715	(1099)	1,222	(495)	135,209	(54,740) ⁵	0.90
Recovery Region 4										
Future Known	14	56	(90)	1,086	(440)	489	(198)			0.40
Predicted Future Additional	21	84	(135)	1,629	(660)	733	(297)			0.60
Recovery Region 4 Total	35	140	(225)	2,715	(1099)	1,222	(495)	122,753	(49,698)	1.00
Recovery Region 6										
Future Known	0		0		0		0			0
Predicted Future Additional	5	20	(32)	388	(157)	175	(71)			9.43
Recovery Region 6 Total	5	20	(32)	388	(157)	175	(71)	1,850	(749) ⁶	9.43
Indirect Total	100	400	(644)	7,758	(3,141)	3,491	(1,413)	1,450,438	(587,222) ⁷	0.24

¹Estimated total miles (kilometers) of facilities (electric transmission lines) within the distribution range of the black-capped vireo.

²Estimated total right-of-way acreage of facilities within the distribution range of the black-capped vireo based on 160-foot (49-meter)-wide rights-of-way.

³Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

⁴Estimated total habitat does not include Cooke, Denton, Eastland, Grayson, Hill, Jack, Shackelford, or Wise counties.

⁵Estimated total habitat does not include McLennan County.

⁶Estimated total habitat does not include Jeff Davis County.

⁷Estimated total of black-capped vireo habitat throughout Texas breeding range.

Note: Numbers depicted are rounded and as such apparent discrepancies with totals are due to rounding error of subtotals.

Table 5-9c. Acres (Hectares) of Potential Impact to Black-Capped Vireo Habitat by Recovery Region for Covered Activities

Facilities	Acres (Hectares) of Potential Impact ¹		from NRCS Biological Opinion (Service 2004g)		% of Habitat Affected by Incidental Take
			Estimated Acres (Hectares) of Black-Capped Vireo Habitat		
Recovery Region 1					
Existing Facility Direct Impacts	685	(277)			1.76
Future Facility Direct Impact	233	(94)			0.60
Future Facility Indirect Impacts	873	(353)			2.24
Recovery Region 1 Total	1,790	(725)	38,977	(15,780) ²	4.59
Recovery Region 2					
Existing Facility Direct Impacts	370	(150)			0.27
Future Facility Direct Impact	326	(132)			0.24
Future Facility Indirect Impacts	1,222	(495)			0.90
Recovery Region 2 Total	1,918	(777)	135,209	(54,740) ³	1.42
Recovery Region 4					
Existing Facility Direct Impacts	237	(96)			0.19
Future Facility Direct Impact	326	(132)			0.27
Future Facility Indirect Impacts	1,222	(495)			1.00
Recovery Region 4 Total	1,785	(723)	122,753	(49,698)	1.45
Recovery Region 6					
Existing Facility Direct Impacts		0			0
Future Facility Direct Impact	47	(19)			2.52
Future Facility Indirect Impacts	175	(71)			9.43
Recovery Region 6 Total	221	(89)	1,850	(749) ⁴	11.95
Total Impacts	5,714	(2,313)	1,450,438	(587,222)⁵	0.39

¹Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

²Estimated total habitat does not include Cooke, Denton, Eastland, Grayson, Hill, Jack, Shackelford, or Wise counties.

³Estimated total habitat does not include McLennan County.

⁴Estimated total habitat does not include Jeff Davis County.

⁵Estimated total of black-capped vireo habitat throughout Texas breeding range.

Note: Numbers depicted are rounded and as such apparent discrepancies with totals are due to rounding error of subtotals.

5.2.10 Red-Cockaded Woodpecker

Impacts to the red-cockaded woodpecker from covered activities would be considered significant if they were to result in one or more of the following:

- The existing primary threats to the habitat used by the species would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
- The size of the red-cockaded woodpecker population in the proposed Permit Area would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).
- The recovery tasks or actions of the red-cockaded woodpecker recovery plan were furthered or achieved (beneficial effects – no adverse effects) or were precluded from being implemented or achieved (adverse effects).

5.2.10.1 Direct Impacts

Loss of habitat could result in direct impacts to the breeding and foraging success of the red-cockaded woodpecker. A decrease in habitat quality could force some individuals to migrate from suitable habitat to less-desirable locations where the species' habitat may already be at its carrying capacity. Because the normal routing process for new transmission lines includes measures for minimizing impacts to forested areas, it is not likely that construction of new facilities would result in impacts to large amounts of red-cockaded woodpecker habitat. Therefore, adverse impacts to this species resulting from covered activities within the proposed Permit Area are expected to be minor to moderate.

Adherence to the avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document would minimize direct impacts to the red-cockaded woodpecker from covered activities. Specific actions to reduce direct impacts to this species from covered activities include, but are not limited to, assessing habitat suitability and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; minimizing habitat fragmentation, where suitable or potential habitat cannot be avoided, by paralleling other existing rights-of-way, if feasible; performing covered activities, if proximal to red-cockaded woodpecker cluster boundaries, outside of the nesting season and not during the hours immediately preceding and following sunrise and sunset, when practicable; limiting clearing of access roads unless absolutely necessary; and trimming or topping taller trees adjacent to the rights-of-way to the minimum necessary amount required for compliance with National Safety Codes and removing such trees only when they qualify as danger trees.

5.2.10.2 Indirect Impacts

For the red-cockaded woodpecker, potential indirect impacts have been linked to vehicular activity within active colonies throughout the year. Vehicular activity, both related and unrelated to covered activities,

can result in indirect impacts to the red-cockaded woodpecker through excessive soil compaction, damage to cavity tree roots, groundcover disturbance, and noise disturbance. Soil compaction and root damage elevate the potential for cavity tree mortality (Conner et al. 1991; Hicks et al. 1987; Nebeker and Hodges 1985); changes in the groundcover may affect prey abundance (Collins 1998), nutrient value of prey (James et al. 1997), and fire frequency and intensity through changes in fuel; and noise disturbance may disrupt roosting and breeding activities. Noise disturbance, though a direct impact when part of covered activities, would be an indirect impact when associated with future unrelated activities facilitated by covered activities, such as off-road vehicle trespass. Additionally, human disturbance near clusters may indirectly increase the risk of pileated woodpecker cavity enlargement and subsequent abandonment by red-cockaded woodpeckers (Service 1985b).

No significant indirect impacts are anticipated from the covered activities for the red-cockaded woodpecker. Indirect impacts to this species will be negated or minimized by the avoidance, minimization, and conservation measures, and other BMPs described in Section 6. Specific actions to reduce indirect impacts to this species from covered activities include, but are not limited to, assessing habitat suitability and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; minimizing soil disturbance by covered activities and, where disturbance occurs, using native soils for backfill and revegetating with native species to reduce the risk of exotic and/or invasive species introduction or facilitation, such as red fire ants and nonnative grasses, which could negatively affect habitat quality; performing covered activities, if proximal to red-cockaded woodpecker cluster boundaries, outside of the nesting season and not during the hours immediately preceding and following sunrise and sunset, when practicable; limiting the clearing of access roads outside of the rights-of-way to only where absolutely necessary; trimming or topping taller trees adjacent to the rights-of-way to the minimum necessary amount required for compliance with National Safety Codes and removing such trees only when they qualify as danger trees; and minimizing vehicular traffic within red-cockaded woodpecker habitat in completing covered activities and controlling access to restrict unauthorized vehicular traffic unrelated to covered activities, which unabated would otherwise cause soil compaction and reduced habitat suitability.

5.2.10.3 Assessment of Take

5.2.10.3.1 Existing Facilities

The Applicant currently has 477 miles (767 kilometers) totaling 9,251 acres (3,745 hectares) of existing electric facility rights-of-way within the range of the red-cockaded woodpecker in the proposed Permit Area: 108 miles (174 kilometers) or 2,095 acres (848 hectares) in Angelina County, 159 miles (256 kilometers) or 3,084 acres (1,249 hectares) in Cherokee County, 62 miles (100 kilometers) or 1,202 acres (487 hectares) in Houston County, and 148 miles (238 kilometers) or 2,870 acres (1,162 hectares) in Nacogdoches County (Table 5-10). The Applicant estimates that 247 acres (100 hectares) of potential red-cockaded woodpecker habitat could be directly impacted by the operation

and maintenance of the existing electric facilities within the proposed Permit Area: 59 acres (24 hectares) in Angelina County, 77 acres (31 hectares) in Cherokee County, 28 acres (11 hectares) in Houston County, and 83 acres (34 hectares) in Nacogdoches County. The basis for these estimates is discussed below. Because of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this document, the Applicant believes that adverse indirect impacts to the red-cockaded woodpecker from operation and maintenance of existing facilities will be avoided.

Angelina County. The Applicant currently has 108 miles (174 kilometers) or 2,095 acres (848 hectares) of existing electric facility rights-of-way in Angelina County. An estimated 13 to 59 acres (5 to 24 hectares) of potential red-cockaded woodpecker habitat is within the rights-of-way for these existing electric transmission line facilities, according to the following logic. About 65 percent of Angelina County is covered by pine and mixed pine-hardwood forest (Soil Conservation Service 1988), with 15 percent of that being bottomland hardwood forest and 85 percent being pine forest (Texas Parks and Wildlife Department 2004). This results in an estimated pine forest coverage for the county of 55 percent. Based on historical rights-of-way maintenance practices in east Texas, the Applicant believes that forested encroachment from ingrowth of trees along the edge of and successional transition to forested vegetational cover within the existing rights-of-way could range from 1 to 5 percent. Combining these percentages, operation and maintenance activities would impact potential red-cockaded woodpecker habitat within, at most, 2.8 percent (59 acres or 24 hectares) of existing electric facility rights-of-way in Angelina County.

Table 5-10. Acres (Kilometers) of Potential Impact to the Red-Cockaded Woodpecker

Facilities	County	Miles (Kilometers) of Facilities ¹		Rights-of-way Acres (Hectares) of Facilities ²		Acres (Hectares) of Potential Impact ³	
Existing	Angelina	108	(174)	2,095	(848)	59	(24)
	Cherokee	159	(256)	3,084	(1,249)	77	(31)
	Houston	62	(100)	1,202	(487)	28	(11)
	Nacogdoches	148	(238)	2,870	(1,162)	83	(34)
	Total Existing	477	(768)	9,251	(3,745)	247	(100)
Future	Direct	100	(161)	1,939	(785)	56	(23)
	Indirect	100	(161)	7,273	(2,945)	211	(85)
	Total Future	200	(322)	9,212	(3,730)	267	(108)
Total		577	(929)	11,190	(4,530)	514	(208)

¹ Estimated total miles of facilities (electric transmission lines) within the distribution range of the red-cockaded woodpecker.

² Estimated total right-of-way acreage of facilities within the distribution range of the red-cockaded woodpecker based on 160-foot (49-meter)-wide rights-of-way.

³ Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

General Note: Numbers rounded.

Cherokee County. The Applicant currently has 159 miles (256 kilometers) or 3,084 acres (1,249 hectares) of existing electric facility rights-of-way in Cherokee County. An estimated 16 to 79 acres (6 to 32 hectares) of potential red-cockaded woodpecker habitat is within the rights-of-way for these existing electric transmission line facilities, according to the following logic. About 60 percent of Cherokee County is covered by pine and mixed pine-hardwood forest (Soil Conservation Service 1959, Handbook of Texas 2006) with 15 percent of that being bottomland hardwood forest and 85 percent being pine forest. This results in an estimated pine forest coverage for the county of 51 percent. As noted above, based on historical rights-of-way maintenance practices in east Texas, the Applicant believes that from 1 to 5 percent of its existing rights-of-way has transitioned to forested vegetational cover due to forested encroachment from ingrowth of trees along the edge of and successional transition to forested vegetational cover within the rights-of-way. Combining these percentages, operation and maintenance activities would impact potential red-cockaded woodpecker habitat within, at most, 2.6 percent (77 acres or 31 hectares) of the existing electric facility rights-of-way in Cherokee County.

Houston County. The Applicant currently has 62 miles (100 kilometers) or 1,202 acres (487 hectares) of existing electric facility rights-of-way in Houston County. An estimated 6 to 28 acres (2 to 11 hectares) of potential red-cockaded woodpecker habitat is within the rights-of-way for these existing electric transmission line facilities, according to the following logic. About 54 percent of Houston County is covered by pine and mixed pine-hardwood forest (Soil Conservation Service 2002b), with 15 percent of that being bottomland hardwood forest and 85 percent being pine forest (Texas Parks and Wildlife Department 2004). This results in an estimated pine forest coverage for the county of 46 percent. Again, based on historical rights-of-way maintenance practices in east Texas, the Applicant believes that from 1 to 5 percent of its existing rights-of-way has transitioned to forested vegetational cover due to forested encroachment along the edge of, and transition to forested vegetational cover within, the rights-of-way. Combining these percentages, operation and maintenance activities would impact potential red-cockaded woodpecker habitat within, at most, 2.3 percent (28 acres or 11 hectares) of existing electric facility rights-of-way in Houston County.

Nacogdoches County. The Applicant currently has 148 miles (238 kilometers) or 2,870 acres (1,162 hectares) of existing electric facility rights-of-way in Nacogdoches County. An estimated 16 to 83 acres (6 to 34 hectares) of potential red-cockaded woodpecker habitat is within the rights-of-way for these existing electric transmission line facilities, according to the following logic. About 67 percent of Nacogdoches County is covered by pine and mixed pine-hardwood forest (Soil Conservation Service 1980c), with 15 percent of that being bottomland hardwood forest and 85 percent being pine forest (Texas Parks and Wildlife Department 2004). This results in an estimated pine forest coverage for the county of 57 percent. Based on historical rights-of-way maintenance practices in east Texas, the Applicant believes that from 1 to 5 percent of its existing rights-of-way has transitioned to forested vegetational cover due to forested encroachment along the edge of, and transition to forested vegetational cover within, the rights-of-way. Combining these percentages, operation and maintenance activities would impact potential red-cockaded woodpecker habitat within, at most, 2.8 percent (83 acres or 34 hectares) of existing electric facility rights-of-way in Nacogdoches County.

5.2.10.3.2 New Facilities

The Applicant believes that between 10 and 56 acres (4 and 23 hectares) of potential habitat may be directly impacted as a result of constructing new facilities. This estimate is based on construction of a new 345-kV electric transmission line, 100 miles (161 kilometers) or 1,939 acres (785 hectares) of which pass through potential habitat areas, with an estimated 0.5 to 2.9 percent of the new rights-of-way impacting potential habitat. These percentages are based on the lowest minimum percentage (Houston County) and highest maximum percentage (Nacogdoches County) estimated by county for the Applicant's existing facilities. The Applicant believes that estimates of encroached potential habitat on existing rights-of-way established before the ESA or listing of many of the current protected species are representative of the amount of potential habitat that might be encountered on new rights-of-way. The Applicant is requesting direct take of 56 acres (23 hectares) for new facilities for the red-cockaded woodpecker.

As noted above, most HCPs processed by the Service have suggested that indirect impacts affect the golden-cheeked warbler and black-capped vireo up to 300 feet (91 meters) from a newly created edge. A generally accepted buffer distance has not been defined for indirect impacts to the red-cockaded woodpecker; however, potential indirect impacts from proposed covered activities are largely congruous for covered avian species (e.g., nest predation, trespass-related noise disturbance, and others). Therefore, it is reasonable to assume a similar buffer distance may also be applicable for the red-cockaded woodpecker. It then follows that approximately 7,273 acres (2,945 hectares) of potential red-cockaded woodpecker habitat would occur within 300 feet (91 meters) of future rights-of-way. Based on the maximum of 2.9 percent noted above for direct impacts, the Applicant believes at most 211 acres (85 hectares) of potential habitat may be indirectly impacted as a result of constructing new facilities. Because of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this HCP, the Applicant believes that indirect impacts to the red-cockaded woodpecker from existing facilities will be avoided. Assessment methods for determining potential red-cockaded woodpecker habitat are discussed in the Conservation Program (Section 6) of this HCP.

The total area of potential red-cockaded woodpecker habitat that may be impacted by both existing and new electric facilities is 514 acres (208 hectares). The Applicant is requesting take for this amount. Service recommendations (Omar Bocanegra, pers. comm. to D. Green, PBS&J, April 2010) include that the take standard be a minimum of 3,000 square feet (689 square meters) of pine basal area, including only pines \geq 10 inches (25.4 centimeters) diameter at breast height, provided on a minimum of 75 acres (30.4 hectares). Furthermore, all land classified as foraging habitat must be within 0.25 mile (0.4 kilometer) of the cluster, and that any stand counted as foraging habitat be within 200 feet (61 meters) of another foraging stand or the cluster itself.

5.2.11 Louisiana Black Bear

Impacts to the Louisiana black bear from covered activities would be considered significant if they were to result in one or more of the following:

- The existing primary threats to the habitat used by the species would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
- The size of the Louisiana black bear population in the proposed Permit Area would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).
- The recovery tasks or actions of the Louisiana black bear recovery plan were furthered or achieved (beneficial effects – no adverse effects) or were precluded from being implemented or achieved (adverse effects).

5.2.11.1 Direct Impacts

While Louisiana black bears in the area would likely avoid the initial clearing and construction activities by moving into adjacent areas outside the rights-of-way and thus preventing injury to individuals, vegetation clearing may directly impact the species by disrupting some Louisiana black bear activity, particularly during the breeding season. Loss of habitat could result in adverse direct impacts to the breeding and foraging success of this species. A decrease in habitat quality could force some individuals to migrate from suitable habitat to less-desirable locations where the species' habitat may already be at its carrying capacity. Overall, adverse impacts to Louisiana black bears resulting from covered activities within the proposed Permit Area are expected to be minor to moderate.

Adherence to the avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this HCP would minimize direct impacts to the Louisiana black bear from covered activities. Specific actions to reduce direct impacts to this species from covered activities include, but are not limited to, assessing habitat suitability and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; minimizing fragmentation of contiguous patches of forest, and where suitable or potential habitat cannot be avoided, paralleling other existing rights-of-way, if feasible; avoiding damage to existing or candidate den trees and den sites; reducing rights-of-way widths, if practical; limiting clearing of access roads unless absolutely necessary; and trimming taller trees adjacent to the rights-of-way the minimum amount necessary.

5.2.11.2 Indirect Impacts

For the Louisiana black bear, both beneficial and adverse indirect impacts could occur from the covered activities. Whereas habitat fragmentation could have adverse direct effects by altering habitat suitability and bear behavior, such as foraging and breeding, the creation of edge habitat along the rights-of-way would promote soft mast producing woody plants and other plants that contribute to black bear forage,

providing a beneficial indirect impact. Should covered activities increase unauthorized human activity within the rights-of-way (e.g., offroad vehicle trespass), an adverse indirect impact would result based on the sensitivity of the Louisiana black bear to human disturbance (Service 1995a).

However, no significant adverse indirect impacts from the covered activities are anticipated for the Louisiana black bear. Indirect impacts to this bear from covered activities will be minimized by the avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document. Specific actions to reduce indirect impacts to this species from covered activities include, but are not limited to, assessing habitat potential and/or occupancy on a project-by-project basis and through continued coordination with the Service; avoiding populations of this species, its habitat, and lands managed for its conservation and recovery in completing the covered activities, to the maximum extent practicable; minimizing fragmentation of contiguous patches of forest, and where suitable or potential habitat cannot be avoided, paralleling other existing rights-of-way, if feasible; limiting clearing of access roads unless absolutely necessary; obstructing access points, with gates or permanent road closures, to prevent unauthorized public use of the rights-of-way; and bush-hogging rights-of-way within potential habitat to promote the growth of plant species suitable for black bear forage.

5.2.11.3 Assessment of Take

5.2.11.3.1 Existing Facilities

The Applicant currently has 1,334 miles (2,146 kilometers) of existing electric facility rights-of-way within the range of the Louisiana black bear. None of this, however, is within potential habitat for the Louisiana black bear. Based on habitat characteristics and current rights-of-way maintenance practices, the Applicant does not believe that any activities associated with existing facilities will result in the incidental take of Louisiana black bear habitat.

5.2.11.3.2 New Facilities

Based on the construction of new 345-kV electric transmission facilities, 100 miles (161 kilometers) or 1,939 acres (785 hectares) of which will pass through potential habitat areas for the Louisiana black bear, the Applicant estimates that 194 acres (79 hectares) will be impacted. This acreage was determined from an analysis of data available for Angelina County, where about 65 percent of the county is covered by pine and mixed pine-hardwood forest (Soil Conservation Service 1988), with 15 percent of that being bottomland hardwood forest and 85 percent being pine forest (Texas Parks and Wildlife Department 2004). This results in an estimated bottomland hardwood forest coverage for the county of 10 percent. Given avoidance requirements in contemporary route selection processes, the Applicant believes that 10 percent of the new rights-of-way could impact potential habitat, i.e., 194 acres (79 hectares). While the Service is currently unaware of any reproducing black bear (Louisiana or American) populations in east Texas and, thus, no occupied habitat has been identified in that part of the state (Omar Bocanegra, the

Service, pers. comm. to D. Green, PBS&J, December 2009), it is possible that occupied habitat may be discovered during the 30-year term of the permit.

The Applicant believes that measures can be taken when designing and constructing new facilities to avoid indirect take of the Louisiana black bear. Because of general and species-specific avoidance, minimization, and conservation measures and BMPs referenced above and established by the Conservation Program (Section 6) of this document, the Applicant believes that indirect impacts to the Louisiana black bear from construction of new facilities will be avoided. The Applicant is requesting a total of 194 acres (79 hectares) of take for the Louisiana black bear (Table 5-11).

Table 5-11. Acres (Hectares) of Potential Impact to the Louisiana Black Bear Within the Proposed Permit Area

Facilities	County	Miles (Kilometers)		Rights-of-Way Acres		Acres (Hectares) of	
		of Facilities ¹		(Hectares) of Facilities ²		Potential Impact ³	
Existing	Species Range	1,334	(2,146)	25,872	(10,470)	0	(0)
Future	Direct	100	(161)	1,939	(785)	194	(79)
TOTAL		1,434	(2,307)	27,811	(11,255)	194	(79)

¹ Estimated total miles of facilities (electric transmission lines) within the distribution range of the Louisiana black bear.

² Estimated total right-of-way acreage of facilities within the distribution range of the Louisiana black bear based on 160-foot (49-meter)-wide rights-of-way.

³ Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

General Note: Numbers rounded.

5.2.11.3.3 Critical Habitat

Critical habitat for the Louisiana black bear does not occur within the proposed Permit Area. No direct or indirect impacts to critical habitat for this species will occur from the covered activities. As such, impacts from covered activities proposed under this HCP will not result in the adverse modification of designated critical habitat for the Louisiana black bear.

5.2.12 Summary of Requested Incidental Take Authorization

As noted earlier in this document, incidental take can be expressed in terms of the number of individuals or the amount of habitat taken. Because the precise number of individuals impacted is indeterminable, incidental take for the covered species for this HCP, except for the whooping crane, is expressed in terms of the number of acres of potential habitat directly and/or indirectly impacted by the covered activities. The whooping crane, however, is expressed in terms of the number of individuals. This section provides a summary of the incidental take of habitat or number of individuals, as appropriate, for each species under the associated section 10(a)(1)(B) permit. Estimates of incidental take are derived from the

Applicant’s past project experience; covered projects; extent of existing facilities in the vicinity of known suitable and/or occupied habitat; and the potential for future system expansion.

The Applicant has projected an acreage of potential and/or occupied habitat for the 10 species that may be impacted as a result of the covered activities, and an estimated take of the number of individuals for the whooping crane. These estimates, presented in Table 5-12, reflect the maximum allowable take under the requested permit. The impact acreage estimates involved extensive research to gather data relating to mileage and rights-of-way acreage for existing linear facilities within the Applicant’s proposed Permit Area, along with projections of future maintenance/replacement of these facilities. Locations of existing facilities were compared to Service county listings for each covered species by utilizing the Applicant’s knowledge of known potential habitat locations in relation to existing facilities. Additionally, maximum values include a growth reserve to account for unidentified new construction of linear and nonlinear facilities. It should be noted that the Service county listings are subject to change and the online current version will be consulted for projects.

Table 5-12. Acres (Hectares) of Requested Incidental Take Authorization for Covered Species

Common Name ¹	Scientific Name ¹	Service Status ²	Authorized Incidental Take Requested ³	
PLANTS				
Large-fruited sand-verbena	<i>Abronia macrocarpa</i>	E	5.5	(2.2)
Texas poppy-mallow	<i>Callirhoe scabriuscula</i>	E	64	(26)
Navasota ladies'-tresses	<i>Spiranthes parksii</i>	E	943	(382)
Pecos sunflower	<i>Helianthus paradoxus</i>	T	9	(3.6)
INVERTEBRATES				
American burying beetle	<i>Nicrophorus americanus</i>	E	3,972	(1,608)
AMPHIBIANS				
Houston toad	<i>Bufo houstonensis</i>	E	635	(257)
BIRDS				
Whooping crane ⁴	<i>Grus americana</i>	E		
Golden-cheeked warbler	<i>Dendroica chrysoparia</i>	E	2,997	(1,213)
Black-capped vireo	<i>Vireo atricapilla</i>	E	5,714	(2,313)
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	514	(208)
MAMMALS				
Louisiana black bear	<i>Ursus americanus luteolus</i>	T	194	(79)

¹Nomenclature follows the Service (2010).

²Service – U.S. Fish and Wildlife Service.

E – Endangered; T – Threatened.

³Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

⁴Potential effects not calculated on acreage basis. Estimated take of 1 individual over 30-year project life.

The requested permit would not result in a change or reduction in the current methods of evaluation of environmental criteria, including the identification of potential and known locations of covered species; it would serve only to expedite the approval process when covered species are encountered and when the potential exists for incidental take. It is the Applicant’s goal to manage its activities so that impacts fall

below the requested level of incidental take. The Applicant will document a county-by-county tally of habitat impacted to ensure that the authorized level of take is not exceeded.

5.3 OTHER SPECIES OF SPECIAL INTEREST

As noted in Section 3.3, several other federally listed species, as well as several Federal candidate species, have been recorded in the proposed Permit Area. These include 2 plants, the endangered Texas prairie dawn-flower and a threatened plant with no common name (*Geocarpon minimum*); 2 endangered invertebrates, the Pecos assiminea snail and the Bee Creek Cave harvestman; 3 endangered fish, the Leon Springs pupfish, Comanche Springs pupfish, and Pecos gambusia; 2 reptiles, the threatened Concho Watersnake and proposed endangered dunes sagebrush lizard; and 6 birds, the endangered northern aplomado falcon, interior least tern, and southwestern willow flycatcher, the threatened piping plover and Mexican spotted owl, and the proposed threatened mountain plover. The candidate species are 3 plants, the Guadalupe fescue, Neches River rose-mallow, and Texas golden gladebush; 5 aquatic invertebrates, the Phantom Lake Cave snail, Phantom Spring snail, Diamond Y Spring snail, Gonzales Spring snail, and diminutive amphipod; 2 fish, the smalleye shiner and sharpnose shiner; 2 amphibians, the Salado salamander and Jollyville Plateau salamander; 1 reptile, the Louisiana pinesnake; and 3 birds, the lesser prairie-chicken, Sprague's pipit, and yellow-billed cuckoo.

Impacts to these other species of special interest from covered activities would be considered significant if they were to result in either or both of the following:

- The existing primary threats to these other species of special interest would decrease (beneficial effects – no adverse effects) or increase (adverse effects) to a substantial degree.
- The long-term population trends of any of these other species of special interest in the proposed Permit Area would substantially increase (beneficial effects – no adverse effects) or substantially decrease (adverse effects).

The level of potential impact to the other species of special interest is defined as follows:

- **Negligible:** The existing primary threats to the other species of special interest would not be affected or the change would be so small as not to be of any measurable or perceptible consequence to the population in the proposed Permit Area.
- **Minor:** A measurable effect on the existing primary threats to the species of special interest would occur, but the change would be small and relatively localized and would not affect the long-term population trends within the proposed Permit Area.
- **Moderate:** A noticeable effect on the existing primary threats to the species of special interest would occur. The effect would be of consequence to the long-term population trends within the proposed Permit Area.
- **Major:** A noticeable effect on the existing primary threats to the species of special interest with severe consequences or exceptional benefits to the long-term population trends within the proposed Permit Area would occur.

For the purpose of this analysis, these other species of special interest have been broken down into the following groups: plants, aquatic species, karst invertebrates, reptiles, and birds.

5.3.1.1 Direct Impacts

The Applicant believes that by using the avoidance, minimization, and conservation measures and other BMPs established by the Conservation Program (Section 6) of this document, and because of the limited distribution or transient nature of almost all of the federally listed and candidate species not covered by the proposed incidental take permit but potentially occurring within the proposed Permit Area, it can avoid impacting these species. Furthermore, mitigation measures in place for the 11 covered species may collaterally have beneficial direct, indirect, and cumulative impacts on some of the other species of special interest, which would then concurrently contribute to their conservation and recovery.

5.3.1.1.1 Aquatic Species

The federally listed aquatic species addressed in this HCP are the Pecos assiminea snail, Leon Springs pupfish, Comanche Springs pupfish, Pecos gambusia, and Concho watersnake. The aquatic candidate species are the Phantom Lake Cave snail, Phantom Spring snail, Diamond Y Spring snail, Gonzales Spring snail, diminutive amphipod, smalleye shiner, sharpnose shiner, Salado salamander, and Jollyville Plateau salamander. Existing threats to these aquatic species include decreased water quality, increased levels of sediments and/or contaminants, low levels of dissolved oxygen, and a reduction in water flows, particularly in springs. Almost all of these species have a very limited distribution in the proposed Permit Area.

The Applicant believes that by using the avoidance, minimization, and conservation measures, and BMPs established by the Conservation Program (Section 6) of this document, and because of the limited distribution, abundance, and/or niche specificity of almost all of the above federally listed and candidate aquatic species within the proposed Permit Area, impacts to these species can be avoided. Specific actions to preclude impacts to these aquatic species include, but are not limited to, avoiding impacts to known populations, their habitats, and lands/waters managed for their conservation and recovery, to the maximum extent practicable, in routing new transmission facilities; where not practicable, avoiding impacts by spanning transmission lines across known populations of these species and their habitat; and, for all covered activities, adhering to stormwater BMPs to prevent, or appreciably minimize so as to have no effect, the risk that covered activities could exacerbate threats to these species and their habitat, as specified above. Compliance with Clean Water Act section 404 regulations would afford further protection, where applicable, to the wetland habitats this species inhabits. Therefore, covered activities are not likely to affect the aquatic species of special interest within the proposed Permit Area under the proposed HCP.

5.3.1.1.2 Plants

The two federally listed plant species, Texas prairie dawn-flower and *Geocarpon minimum*, and the three candidate plant species, the Guadalupe fescue, Neches River rose-mallow, and Texas golden gladeceess, also have a limited distribution in the proposed Permit Area. The Texas prairie dawn-flower is known from Lamar and Trinity counties, while *Geocarpon minimum* is known from Anderson County. The only known population of the Guadalupe fescue is outside of the proposed Permit Area in the Chisos Mountains in the Big Bend National Park in Brewster County. The Neches River rose-mallow occurs in Cherokee, Houston, and Trinity counties, and the experimentally introduced population of the Texas golden gladeceess occurs in Nacogdoches County.

The Applicant believes that by using the avoidance, minimization, and conservation measures, and BMPs established by the Conservation Program (Section 6) of this document, and because of the limited distribution, abundance, and/or niche specificity of all of the above federally listed and candidate plant species within or potentially within the proposed Permit Area, impacts to these species can be avoided. Specific actions to prevent, or appreciably minimize so as to have no adverse impacts on these species include, but are not limited to, avoiding populations of these species, their habitat, and lands managed for their conservation and recovery in routing new transmission facilities, to the maximum extent practicable; constructing new facilities, where possible, adjacent to existing maintained rights-of-way; minimizing soil disturbance caused by covered activities; and minimizing herbicide and pesticide use, to the maximum extent practicable, and using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence), and complying with Service (2004e) guidelines for pesticide application. Therefore, covered activities are not likely to affect the plant species of special interest within the proposed Permit Area under the proposed HCP.

5.3.1.1.3 Karst Invertebrates

The endangered Bee Creek Cave harvestman, a terrestrial karst invertebrate, is of dubious occurrence in Burnet County within the proposed Permit Area. The Applicant believes that by using the avoidance, minimization/conservation measures, and other BMPs described in Section 6 of this document, and because of the limited distribution, abundance, and niche specificity of the above federally listed endangered Bee Creek Cave harvestman that potentially occurs within the proposed Permit Area, impacts to this species can be avoided. Specific actions to prevent, or appreciably minimize so as to have no adverse effect, impacts to this species from covered activities include, but are not limited to, avoidance of impacts to karst features, such as sinkholes, springs, and cave openings, in compliance with pertinent regulations, known populations of this species, should they be discovered in the proposed Permit Area, and lands managed for their conservation and recovery, should they be established, in routing new transmission facilities, to the maximum extent practicable; prevention of sedimentation, erosion, and chemical contamination impacts through adherence to stormwater BMPs (e.g., sediment and erosion controls); the minimization of impacts to surface and groundwater flows through recontouring disturbed

areas to approximate preconstruction contours, where practical and minimizing impacts to soil resources; and minimizing herbicide and pesticide use, to the maximum extent practicable, and using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence), and complying with Service (2004e) guidelines for pesticide application. Therefore, covered activities are not likely to affect the karst invertebrate species of special interest within the proposed Permit Area under the proposed HCP.

5.3.1.1.4 *Reptiles*

The proposed endangered dunes sagebrush lizard and the candidate Louisiana pinesnake, have a more widespread distribution in the proposed Permit Area than most other federally listed and candidate species. The dunes sagebrush lizard has a limited and often spotty distribution in southeastern New Mexico and adjacent west Texas (New Mexico Game and Fish 2004). In Texas, this species is restricted to the Kansan Biotic Province, having been recorded from Andrews, Winkler, Ward, Crane, and Gaines counties (Dixon 2000). All of these counties are within the proposed Permit Area. The Louisiana pinesnake has been recorded from five counties within the proposed Permit Area: Angelina, Cherokee, Houston, Nacogdoches, and Trinity (Dixon 2000).

The Applicant believes that by using the avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document, and because of the limited distribution, abundance, and/or niche specificity of the above reptile species within the proposed Permit Area, impacts to these species can be avoided. Specific actions to preclude impacts to these species include, but are not limited to, avoiding populations of these species, their habitat, and lands managed for their conservation and recovery in routing new transmission facilities, to the maximum extent practicable; constructing new facilities, where possible, adjacent to existing maintained rights-of-way; adhering to stormwater BMPs; minimizing herbicide and pesticide use, to the maximum extent practicable; using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence); and complying with Service (2004e) guidelines for pesticide application. Therefore, covered activities are not likely to affect the reptile species of special interest within the proposed Permit Area under the proposed HCP.

5.3.1.1.5 *Birds*

Within the proposed Permit Area, the federally listed northern aplomado falcon is known only from Reeves County, while the federally listed southwestern willow flycatcher and Mexican spotted owl, and the Federal candidate yellow-billed cuckoo are known only from Culberson County. The mountain plover (federally proposed as threatened) and Sprague's pipit (a Federal candidate) are more widespread within the proposed Permit Area. The candidate lesser prairie-chicken occurs within Andrews, Gaines, and Terry counties. The proposed federally threatened mountain plover, the Federal candidate Sprague's

pipit, and the federally listed interior least tern and piping plover would likely pass through parts of the proposed Permit Area during migration.

The Applicant believes that by using the avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this document, and because of the limited distribution, abundance, transient nature, and/or niche specificity of all of the above federally listed, proposed for Federal listing, and candidate bird species within the proposed Permit Area, impacts to these species can be avoided. Specific actions to preclude impacts to these bird species include, but are not limited to, avoiding populations of these species (e.g., individuals, nests, and nesting colonies), their habitats, and lands managed for their conservation and recovery in performing covered activities, to the maximum extent practicable; constructing new facilities, where possible, adjacent to existing maintained rights-of-way; and spanning riparian areas and wetlands to avoid impacts where re-routing is impracticable. Therefore, covered activities are not likely to affect the avian species of special interest within the proposed Permit Area under the proposed HCP.

5.3.1.2 Indirect Impacts

Because of their limited distribution in the proposed Permit Area and by using the avoidance/minimization/conservation measures and other BMPs described in Section 6 of this document, the Applicant believes that it can avoid all indirect impacts to these other species of special interest. For instance, standard BMPs to revegetate areas disturbed by covered activities with native species when appropriate, unless specifically prohibited by the landowner, would ensure that invasive plant species do not colonize, establish, and then spread to adjacent habitats supporting federally listed or candidate plant species, where they could outcompete, displace, and extirpate these species. Avoidance of federally listed, proposed for Federal listing, and candidate species and their habitat would further preclude indirect impacts, such as reductions in prey availability; introductions of invasive species, diseases, competitors, predators, and parasites; and disturbance from increases in vehicular traffic unrelated to covered activities.

5.4 CUMULATIVE IMPACTS

Cumulative impacts are the incremental impact of activities associated with the Applicant's Preferred Alternative when added to other past, present, and reasonably foreseeable future activities regardless of what agency (Federal or nonfederal) or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively noteworthy actions taking place over a period of time. Cumulative impacts are most likely to arise when a relationship exists between an Applicant's Preferred Alternative and other actions that have occurred or are expected to occur in a similar location or time period, or that involve similar actions. Projects in close proximity to the Applicant's Preferred Alternative would be expected to have more potential for cumulative impacts than those more geographically separated. Accordingly, assessment of cumulative impacts on the covered species must include not only the proposed impacts from covered activities detailed in this HCP but also

those impacts from nonrelated past, current, and reasonably foreseeable future activities occurring over the permit duration. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The proposed Permit Area consists of 100 counties (see Figure 1-1) and the duration of the permit would extend for 30 years. Accumulating and processing past, current, and reasonably foreseeable projects at this spatial and temporal scale with quantitative precision and accuracy is not feasible and is consequently largely speculative. Therefore, the cumulative impacts assessment which follows provides an overview of past, present, and reasonably foreseeable projects within the proposed Permit Area and the potential for these activities, with the addition of anticipated effects from covered activities under the proposed HCP, to have cumulative impacts on the 11 covered species for which section 10(a)(1)(B) incidental take authorization is requested.

5.4.1 General Past and Present Actions within the Proposed Permit Area

As previously noted, the 100-county Permit Area is diverse and includes a variety of topographic, geologic, ecological, and land use features. Portions of the proposed Permit Area have undergone extensive urban or industrial development, while other portions are primarily agricultural and have experienced little development. Major developments have included conversion of native vegetation to agricultural crops or grazing land, urban or rural development, transportation projects, rights-of-way clearing for utilities, and development of industrial facilities. The result is a variety of past and present actions within the proposed Permit Area that have resulted in the existing conditions, as described in Section 3 of this HCP and in the accompanying EIS.

5.4.2 Reasonably Foreseeable Actions within the Proposed Permit Area

A quantifiable, project-specific evaluation of reasonably foreseeable actions within the 100-county Permit Area with precision and accuracy is neither feasible nor practical given the spatial and temporal extent of the area of interest. However, major reasonably foreseeable projects were identified in the proposed Permit Area and include wind power projects, such as wind farms and transmission lines to deliver wind energy to consumers, and transportation projects.

As discussed in Section 2, during the development of the alternatives, a review was conducted to identify existing or proposed conservation plans that would cover the same activities within specific regions or counties within the Applicant's Service Area. Other similar HCPs identified within their Service Area include the Balcones Canyonlands Conservation Plan and Williamson County Regional HCP (RHCP). The Applicant elected to comply with the habitat conservation measures and mitigation described in these plans and therefore eliminated Travis County and Williamson County from their proposed Permit Area. Several other HCPs were identified within Bastrop County and other portions of the Service Area. None of them were countywide and some of them were only for specific activities, such as subdivision

development. Due to these restrictions, the Applicant chose not to utilize those incidental take permits and HCPs.

Most of the proposed wind projects in Texas will be located in the west, northwest, the Panhandle, and along the coast (Texas General Land Office 2009). As of 2007, all of Texas' utility-scale wind projects were in the western parts of the state. The McCamey area, south of Odessa and Midland, saw the first wave of wind development in Texas. West-Central Texas, encompassing the Sweetwater/Abilene area (Taylor and Nolan counties), is home to Texas' largest concentration of wind development, including three of the nation's largest wind projects. The area continues to experience rapid growth and is home to the largest single wind farm in the world, FPL Energy's 735-MW Horse Hollow site, with 428 wind turbines covering about 47,000 acres of Nolan and Taylor counties (Combs 2008).

In 2005, the Texas Legislature passed Senate Bill 20, instructing the Public Utility Commission of Texas (PUC) to designate "Competitive Renewable Energy Zones (CREZs)," geographic areas throughout the state in which renewable energy resources and suitable land areas are sufficient to develop generating capacity from renewable energy technologies. The PUC was then required to develop a plan to construct the transmission infrastructure required to deliver the power from these CREZs to electricity customers across the state of Texas (The Wind Coalition 2009). The PUC selected a plan that includes approximately 2,400 miles of new 345-kV transmission lines to deliver about 18,500 megawatts of wind energy (Electric Reliability Council of Texas [ERCOT] 2008). A portion of these proposed new lines occur within the proposed Permit Area.

Major highway projects throughout Texas include construction of new highways and upgrades to existing highways (TxDOT 2009a, 2009b). The I-69 corridor starts on the Texas-Mexico border and extends through Texas to Louisiana. I-69 is a 1,600-mile-long national highway project with the purpose of connecting Canada and Mexico. The Ports-to-Plains Corridor is a 1,400-mile roadway from the Texas-Mexico border at Laredo through western Texas and parts of Oklahoma and New Mexico to Denver, Colorado. TxDOT is conducting a Feasibility Study for US 190-I-10 that will evaluate the development of either a multi-modal (highway/rail) or single use corridor from El Paso to the Louisiana state line. TxDOT is also conducting a study of the proposed La Entrada al Pacifico Corridor, a planned rural, four-lane divided highway network of 10,500 miles that includes and complements Texas' rural interstate highways. The Gulf Coast Strategic Highway System is proposed as an upgrade of existing highways in Texas, Louisiana, and Mississippi to provide better connectivity between Fort Bliss, Fort Hood, and Fort Polk and the strategic ports at Corpus Christi and Beaumont (Gulf Coast Strategic Highway Coalition 2009). All or portions of each of these projects occur within the proposed Permit Area.

5.4.3 Evaluation of Cumulative Effects

5.4.3.1 Cumulative Impacts on the Large-fruited Sand-Verbena

The known distribution of the large-fruited sand-verbena is restricted to nine populations within three Texas counties: Freestone, Leon, and Robertson, all of which are within the Permit Area. The number of

individual plants within each population ranges from approximately 750 at one site in Robertson County to 30,000 at a site in Leon County (Center for Plant Conservation 2009, Poole et al. 2004, Service 1992a, 2010, Texas Parks and Wildlife Department 1996a). Population estimates conducted in 2006 at eight of the nine sites suggest over 94,450 plants across more than 180 acres (73 hectares) are known to exist in the wild (Center for Plant Conservation 2010). However, neither the geographic extent of suitable habitat and populations nor the relative importance of land area and minimum population levels required for viability are known (Service 1992a).

Avoidance of known populations and potentially suitable habitat would prevent, or appreciably minimize so as to have no adverse impacts from new facilities under the proposed HCP. Proposed maintenance and operations of existing facilities may result in the incidental take of 5.5 acres (2.2 hectares) of potential large-fruited sand-verbena habitat. Where impacts to suitable habitat would occur, implementation of avoidance, minimization, conservation, and BMPs will minimize impacts.

A determination of past and currently authorized Federal actions that have impacted or will impact the large-fruited sand-verbena was completed through query of the Service's Southwest Ecological Service Electronic Library (Service 2010) and Environmental Conservation Online System (Service 2010). No record exists for such activities. Unauthorized clearing of large-fruited sand-verbena habitat has likely occurred in the past in Freestone, Leon, and Robertson counties. However, the location and extent of such past activities are unknown and impossible to account for in determining cumulative impacts. Residential, resort, and oil well construction present the greatest threat to the large-fruited sand-verbena and have resulted in the permanent elimination of much of its habitat. Conversion of sand-verbena habitat to pasture grasses, such as bermudagrass, lovegrass, and winter annuals has been and continues to be another cause of habitat loss or modification, as it leads to increased ground cover and, ultimately, soil stabilization. Additionally, the suppression of natural fires has caused woody species to encroach upon the open, sandy areas occupied by this species (53 *Federal Register* 37976, Texas Parks and Wildlife Department 1996a).

Reasonably foreseeable actions that may adversely affect large-fruited sand-verbena habitat in the Permit Area, in addition to those generally discussed above, are related to the existing threats to the species. The Texas Workforce Commission (TWC) indicates that human populations in the Brazos Valley Region (includes Leon and Robertson counties) and the Heart of Texas Region (includes Freestone County), State Planning Regions containing large-fruited sand-verbena habitat, increased by 11 and 9.2 percent, respectively, from 2000 to 2008 (TWC 2009). Continued growth is anticipated from 2008 to 2040, with projected population increases of 26.9 and 30.5 percent, respectively (TWC 2009). To accommodate this growth, increased residential and commercial development and habitat conversion would likely occur. Such projects would also likely lead to the construction of more roads, utilities, and infrastructure appurtenances, as well as increased fire suppression efforts to protect these structures. Although it is impossible to quantify the extent to which these actions will impact the large-fruited sand-verbena, it is reasonable to assume that they may result in a loss of large-fruited sand-verbena habitat.

Given the uncertainty regarding the extent of suitable habitat, the occurrence of populations, the population- and habitat-level requirements for species' viability, and species' disturbance thresholds, the assessment of cumulative effects from the proposed HCP is difficult. However, respective of past, current, and reasonably foreseeable Federal and nonfederal actions within the proposed Permit Area, it is unlikely that covered activities under the proposed HCP would have cumulative impacts on the recovery and survival of the large-fruited sand-verbena. Covered actions would be in response to development and population growth rather than promote these activities, and such activities would likely have a much greater impact than covered activities on the large-fruited sand-verbena. Although covered activities would contribute to cumulative impacts to large-fruited sand verbena within the proposed Permit Area, the contribution would be negligible compared to other actions within the area. Additionally, implementation of BMPs described in this HCP and mitigation actions established in the Conservation Plan (Section 6) would further reduce potential contribution of covered activities to cumulative impacts within the proposed Permit Area.

5.4.3.2 Cumulative Impacts on the Texas Poppy-Mallow

The present distribution of the Texas poppy-mallow is restricted to former and current terraces of the upper Colorado River underlain by the deep, loose sands of the Tivoli soil series and includes over 10 known populations, all of which are in the Permit Area and occur in Coke, Mitchell, and Runnels counties (Poole et al. 2004, Service 2010, Texas Parks and Wildlife Department 1996b). Evidence suggests that the historic population center is in Runnels County several miles southwest of Ballinger. This site covers approximately 395 acres (160 hectares) of deep sands that once supported a large contiguous population of the species, but presently only supports segregated populations due to habitat fragmentation (Service 1985a). A population survey of this area in 1979 indicated presence of approximately 48,000 plants covering an estimated 12.4 acres (5 hectares). Subsequent field survey in 1983 indicated loss of the largest population therein and reduction in the number of individuals across populations (Service 1985a). The sites in Coke and Mitchell counties were recorded more recently, after 1985. As of 1987, all known locations occurred on private land and on TxDOT and public transportation rights-of-way (Poole and Riskind 1987). At least one population has private landowner protection.

Under the proposed HCP, avoidance of known populations and potentially suitable habitat would preclude impacts from construction of new facilities. Proposed maintenance and operations of existing facilities may result in the incidental take of 64 acres (26 hectares) of potential Texas poppy-mallow habitat. Where impacts to suitable habitat would occur, implementation of avoidance, minimization, conservation, and BMPs will minimize impacts.

A determination of past and currently authorized Federal actions that have impacted or will impact the Texas poppy-mallow was completed through query of the Service's Southwest Ecological Service Electronic Library (Service 2010) and Environmental Conservation Online System (Service 2010). No record for such activities was identified. Unauthorized clearing of Texas poppy-mallow habitat has likely occurred in the past in Coke, Mitchell, and Runnels counties. Habitat destruction caused by crop and

pasture planting, residential development, road and railway construction, and sand mining has had negative cumulative impacts on the species, especially given its specific habitat requirements (46 *Federal Register* 3184–3186, Texas Parks and Wildlife Department 1996b). However, the location and extent of such past activities are unknown and impossible to quantify in determining cumulative impacts.

Reasonably foreseeable actions that may adversely affect Texas poppy-mallow habitat in the Permit Area, in addition to those generally discussed above, are related to the existing threats to the species. The TWC indicates that human populations in the Concho Valley Region (includes Coke County) and the West Central Texas Region (includes Mitchell and Runnels counties), State Planning Regions containing Texas poppy-mallow habitat, decreased by 0.7 and 0.2 percent, respectively, from 2000 to 2008 (TWC 2009). However, growth is anticipated from 2008 to 2040, with projected population increases of 13.6 and 9.4 percent, respectively (TWC 2009). To accommodate this growth, increased residential and commercial development and habitat conversion would likely occur. Such projects would also likely lead to the construction of more roads, utilities, and infrastructure appurtenances. Although it is impossible to quantify the extent to which these actions will impact the Texas poppy-mallow, it is reasonable to assume that they may result in a loss of Texas poppy-mallow habitat.

Given the uncertainty regarding the extent of suitable habitat, the occurrence of populations, the population- and habitat-level requirements for species' viability, the extent of past habitat fragmentation that has affected extant populations, and the species' disturbance thresholds, the assessment of cumulative effects from the proposed HCP is difficult. However, respective of past, current, and reasonably foreseeable Federal and nonfederal actions within the proposed Permit Area, it is unlikely that covered activities under the proposed HCP would contribute significantly to cumulative impacts on the recovery and survival of the Texas poppy-mallow. Covered actions would be in response to development and population growth rather than promote these activities, and such activities would likely have a much greater impact than covered activities on the Texas poppy-mallow. Although covered activities would contribute to cumulative impacts to Texas poppy-mallow within the proposed Permit Area, the contribution would be negligible compared to other actions within the area. Additionally, implementation of BMPs described in this HCP and mitigation actions established in the Conservation Plan (Section 6) would further reduce potential contribution of covered activities to cumulative impacts within the proposed Permit Area.

5.4.3.3 Cumulative Impacts on the Navasota Ladies'-Tresses

Since its listing in 1982, discoveries of Navasota ladies'-tresses populations have expanded from just two sites in Brazos County to about 100 sites with over 3,141 individual plants in 13 counties, of which six counties are in the proposed Permit Area: Bastrop, Freestone, Leon, Limestone, Milam, and Robertson (Poole et al. 2004, Service 2010, Turner et al. 2003, D. Scott, Natural Diversity Database, pers. comm. to D. Green, PBS&J 2006). The extent of suitable habitat and potential population range is currently unknown, and determination of such data is difficult given that the vast majority of these areas likely

occur on private property. Research is currently underway to develop a predictive model for the species' distribution based on known population locations and habitat requirements (Service 2009d).

Under the proposed HCP, covered activities would result in impacts to 943 acres (382 hectares) of potential Navasota ladies'-tresses habitat. Covered activities for existing facilities would directly impact 841 acres (340 hectares). For new facilities, covered activities would directly impact 97 acres (39 hectares) and indirectly impact 5 acres (2 hectares). Avoidance, minimization, and conservation measures and BMPs would minimize the extent of incidental take within the proposed Permit Area.

A determination of past and currently authorized Federal actions that have impacted or will impact the Navasota ladies'-tresses was completed through consultation of the 5-Year Review (Service 2009d) and query of the Service's Southwest Ecological Service Electronic Library (Service 2010) and Environmental Conservation Online System (Service 2010). Since its listing in 1982, 18 projects that required formal Section 7 consultations resulted in the loss of 520 individual Navasota ladies'-tresses plants and approximately 390.2 acres (157.9 hectares) of habitat. These losses were compensated through the following measures: creation of 21 protected sites with 425.1 acres (172 hectares) of habitat; establishment of 5 long-term monitoring and management plans; fund contributions of \$235,450 to support land acquisition and conservation (an additional amount of over \$244,000 has not yet been collected and funds from Consultation 2-15-1999-F-0055 have not been assessed); and support for research on the ecology, management, propagation, and (pending) genetics of the species. Conservation agreements have raised \$30,000 for population and habitat research, created the Navasota Ladies'-Tresses Conservation Fund, and funded development of a habitat assessment GIS using remote sensing (Service 2009d).

Recovery criteria for downlisting as provided in the species' recovery plan are based on the establishment and maintenance of two safe sites for the species that contain a large proportion of the known individuals (Service 1984a). At present, protected reserves for the species include 24 sites that total 502.1 acres (203.2 hectares) and support, at the highest estimated count, 3,207 Navasota ladies'-tresses (Service 2009d). However, the long-term fate is uncertain for five sites managed and protected by Texas Municipal Power Agency at Gibbons Creek Lignite Mine that total 184.1 acres (74.5 hectares) and include at most 835 individuals following bond release by the Texas Railroad Commission (Service 2009d). Although vast advancement has been made in the recovery of the species and the sole recovery criterion has been met and exceeded, the Service believes that the existing recovery plan is insufficient to recover the species and should be revised (Service 2009d).

Cumulative impacts to Navasota ladies'-tresses habitat from past and currently authorized Federal actions and actions proposed under this HCP would result in the incidental take of approximately 1,333 acres (539 hectares) of suitable Navasota-ladies'-tresses habitat. This estimate does not include unknown, and thus unquantifiable, impacts from past and current actions conducted on private lands that lack a Federal nexus, are compliant with state regulations, or are unauthorized. Given the likely occurrence of most Navasota ladies'-tresses habitat and populations on private lands, these impacts may be substantial. The

most significant threat to this species' survival has been habitat destruction due primarily to strip mining; residential, commercial, and roadway construction; and oil and gas development (NatureServe 2009, Service 1984a, 1995a, Texas Parks and Wildlife Department 1997).

Reasonably foreseeable actions that may adversely affect Navasota ladies'-tresses habitat in the Permit Area, in addition to those generally discussed above, are related to the existing threats to the species. The TWC indicates that human populations in the Brazos Valley Region (includes Leon and Robertson counties), Capital Region (includes Bastrop County), Central Texas Region (includes Milam County), and Heart of Texas Region (includes Freestone and Limestone counties), State Planning Regions containing Navasota ladies'-tresses habitat in the Permit Area, increased by 9.2, 26.4, 12.4, and 5.7 percent, respectively, from 2000 to 2008 (TWC 2009). Further growth is anticipated from 2008 to 2040, with projected population increases of 30.5, 65.6, 44.2, and 26.9 percent, respectively (TWC 2009). To accommodate this growth, increased residential and commercial development and habitat conversion would likely occur. Such projects would also likely lead to the construction of more roads, utilities, and infrastructure appurtenances. Although it is impossible to quantify the extent to which these actions will impact the Navasota ladies'-tresses, it is reasonable to assume that they may result in a cumulative loss of Navasota ladies'-tresses habitat.

Given the uncertainty regarding the extent of suitable habitat, the occurrence of populations, the population- and habitat-level requirements for species' viability, and the species' disturbance thresholds, the assessment of cumulative effects from the proposed HCP is difficult. Respective of past, current, and reasonably foreseeable Federal and nonfederal actions within the proposed Permit Area, it is unlikely that covered activities under the proposed HCP would contribute significantly to cumulative impacts on the recovery and survival of the Navasota ladies'-tresses. Covered actions would be in response to development and population growth rather than promote these activities. Although covered activities would contribute to cumulative impacts to Navasota ladies'-tresses within the proposed Permit Area, the contribution would be negligible compared to other actions within the area. Additionally, implementation of BMPs described in this HCP and mitigation actions established in the Conservation Plan (Section 6) would further reduce potential contribution of covered activities to cumulative impacts within the proposed Permit Area.

5.4.3.4 Cumulative Impacts on the Pecos Sunflower

The present distribution of the Pecos sunflower is restricted to deep, saturated, loamy soils found in spring-fed desert wetlands, called cienegas, in addition to stream, lake and pond margins, and includes seven distinct populations, two in west Texas and five in New Mexico (64 *Federal Register* 56582–56590, 20 October 1999, Poole et al. 2004, Service 2004a). These populations are separated into four disjunct regions designated by the recovery plan as core conservation areas: the west Texas region, the west-central New Mexico region, the Santa Rosa region, and the Roswell/Dexter region, the latter three of which are in New Mexico. Populations in the proposed Permit Area are in the west Texas region and include a population of several hundred thousand plants at Diamond Y Spring, with a smaller group of

plants on a nearby highway rights-of-way, near Fort Stockton in Pecos County and a smaller population at Sandia Spring in the Balmorhea area of Reeves County. At present, the extent of suitable habitat across the range of the species is unknown.

Under the proposed HCP, avoidance of known populations and potentially suitable habitat would preclude impacts from construction of new facilities. Proposed maintenance and operations of existing facilities may result in the incidental take of 9 acres (3.6 hectares) of potential Texas poppy-mallow habitat. Where impacts to suitable habitat would occur, implementation of avoidance, minimization, conservation, and BMPs will minimize impacts. For covered activities on new facilities, avoidance, minimization, and conservation measures and BMPs will prevent impacts to the Pecos sunflower.

A determination of past and currently authorized Federal actions that have impacted or will impact the Pecos sunflower was completed through query of the Service's Southwest Ecological Service Electronic Library (Service 2010) and Environmental Conservation Online System (Service 2010). The only consultation on record resulted in a concurrence of "may affect, but not likely to adversely affect" (Service 2004a). However, the extent of impact to Pecos sunflower habitat is unknown, and thus unquantifiable, for past and current actions conducted on private lands that lack a Federal nexus, are compliant with state regulations, or are unauthorized. Past evidence suggests habitat degradation and elimination due to aquifer depletion, fragmentation, and degradation from agricultural activities, and encroachment by invasive plant species (Poole 1992, Sivinski 1996). Therefore, it is reasonable to assume that many actions having negative impacts on the species have and continue to occur on private land yet are impossible to account for.

Conservation efforts and regulatory statutes applicable to Federal actions, federally permitted activities, and actions on public lands protect a large extent of areas known to be occupied by Pecos sunflower. In New Mexico, populations occur on lands managed by the Service, the Bureau of Land Management, the National Park Service, and the State of New Mexico. Both of the Texas populations occur on land owned and managed by The Nature Conservancy of Texas. The Diamond Y Preserve (3,962-acres [1,603-hectares]) and the Sandia Springs Preserve (246 acres [100 hectares]) are actively managed to remove saltcedar and common sunflower. The Diamond Y Preserve also restricts grazing from August through November and has formed an agreement with the TxDOT to avoid mowing and the use of herbicides within the TxDOT rights-of-way along Diamond Y Creek to protect this species (NatureServe 2009, Service 2004a). Critical habitat designation of 240 acres (97 hectares) primarily within Diamond Y Preserve exhibited, at the time of designation, the PCEs defined as essential to conserve the Pecos sunflower. This critical habitat is estimated to contain several hundred thousand to one million Pecos sunflower plants (73 *Federal Register* 17761, 1 April 2008). Where populations occur outside the boundaries of public lands and conservation areas, some degree of protection would be provided under section 404 regulations of the Clean Water Act for "Waters of the United States." Section 7 consultation would be initiated when populations occur in areas under the jurisdiction of the U.S. Army Corps of Engineers.

Reasonably foreseeable actions that may adversely affect Pecos sunflower habitat in the Permit Area, in addition to those generally discussed above, are related to the existing threats to the species. The TWC indicates that human populations in the Permian Basin Region (includes Pecos and Reeves counties), the State Planning Region containing Pecos sunflower habitat in the Permit Area, increased by 3.6 percent from 2000 to 2008 (TWC 2009). Further growth is anticipated from 2008 to 2040, with a projected population increase of 20.6 percent (TWC 2009). To accommodate this growth, increased residential and commercial development would likely occur. Such projects would also likely lead to the construction of more roads, utilities, and infrastructure appurtenances. Construction activities may directly impact suitable habitat through habitat fragmentation or destruction, or indirectly through introduction of invasive plant species, such as saltcedar. Furthermore, increased population growth would likely elevate water-use demand, which could negatively impact Pecos sunflower populations by lowering water tables through aquifer withdrawals. Increased groundwater drawdown could alter the hydroperiod of these rare spring-fed wetlands, reducing potential habitat and potentially extirpating existing populations. The effects of these impacts when synchronized with drought events would be greatly exacerbated.

Installing new facilities is a response to demands for service rather than the cause of the demand. Providing utility service does not induce population growth; rather, population growth induces the need for expanded and more reliable electric services. Therefore, the activities covered by the proposed incidental take permit would be conducted only in response to this demand over the life of the permit and would not be the cause of population growth or increased development. Although it is impossible to quantify the extent to which these actions will impact the Pecos sunflower, it is reasonable to assume that they may result in a loss of Pecos sunflower habitat.

Respective of past, current, and reasonably foreseeable Federal and nonfederal actions within the proposed Permit Area, it is unlikely that covered activities under the proposed HCP would contribute significantly to cumulative impacts on the recovery and survival of the Pecos sunflower. Covered actions would be in response to development and population growth rather than promote these activities. Although covered activities would contribute to cumulative impacts to Pecos sunflower within the proposed Permit Area, the contribution would be negligible compared to other actions within the area. Additionally, implementation of BMPs described in this HCP and mitigation actions established in the Conservation Plan (Section 6) would further reduce potential contribution of covered activities to cumulative impacts within the proposed Permit Area.

5.4.3.5 Cumulative Impacts on the American Burying Beetle

The present distribution of the American burying beetle covers eight states: Rhode Island (Block Island), Massachusetts (Nantucket Island and Penikese Island), South Dakota, Nebraska, Kansas, Arkansas, Oklahoma, and Texas. The westernmost known occurrence is a 1988 record from Dawes County, Nebraska. This species has disappeared from over 90 percent of its historic range and has been in decline for over a century (Service 1991a, 2005a). Within Texas, the species has been observed in Lamar and Red River counties, both of which are in the proposed Permit Area. An assessment of suitable habitat and

population numbers within these counties and across the species' range has not been completed and would be confounded by the understanding that the species is a habitat generalist, the disjunct distribution of populations, and the inherent difficulties of sampling the species.

Under the proposed HCP, covered activities would result in impacts to 3,972 acres (1,608 hectares) of potential American burying beetle habitat. Covered activities for existing facilities would directly impact 3,041 acres (1,231 hectares). For new facilities, covered activities would directly impact 931 acres (377 hectares). Avoidance, minimization, and conservation measures and BMPs would minimize the extent of incidental take from direct impacts and prevent indirect impacts within the proposed Permit Area.

A determination of past and currently authorized Federal actions that have impacted or will impact the American burying beetle was completed through query of the Service's Southwest Ecological Service Electronic Library (Service 2010) and Environmental Conservation Online System (Service 2010). Section 7 consultation for military training activities and implementation of the Camp Maxey Integrated Natural Resources Management Plan on January 28, 2008, authorized the incidental take of American Burying Beetle annually across a maximum of 2,155.33 acres, in the form of harm and/or harassment resulting from temporary impacts that would not be cumulative over time, and the annual incidental take from infrastructure development totaling up to 12 acres (4.9 hectares) with a maximum take of 60 acres (24 hectares) over 5 years (Service 2008b). The Service determined that this level of anticipated habitat take is not likely to result in jeopardy of the American burying beetle, given compliance with reasonable and prudent measures and terms and conditions of the permit.

Recovery criteria for downlisting as provided in the species' recovery plan target meeting the interim objective of reducing the immediacy of the threat of extinction to the American burying beetle and status improvement and specific criteria include sufficient protection of eastern and western populations so that at least two additional self-sustaining populations of 500 or more beetles are established (one eastern and one western) (Service 1991a). Further, downlisting will be evaluated when three populations have been established (or discovered) within each of four geographical areas (Northeast, Southeast, Midwest, and the Great Lake States), each population contains 500 or more individuals, and each population is self-sustaining for five consecutive years (with satellite populations ideal) (Service 1991a). Within the proposed Permit Area, known populations occur on Federal land (Camp Maxey in Lamar County) and a preserve (Lennox Woods in Red River County) managed by the Nature Conservancy of Texas. As such, these populations are provided some degree of protection.

Cumulative impacts to the American burying beetle from past and currently authorized Federal actions and actions proposed under this HCP would result in the incidental take of 6,187 acres (2,504 hectares), through temporary and permanent impacts, to American burying beetle habitat. This estimate does not include unknown, and thus unquantifiable, impacts from past and current actions conducted on private lands that lack a Federal nexus or are unauthorized. Given the uncertain distribution and abundance of the species within the proposed Permit Area and the unknown extent of suitable habitat, it is impossible to

quantify the cumulative impacts that this take will have. Furthermore, the cause for the decline of this species is not clearly understood, and it could be a result of habitat fragmentation, habitat loss, carcass limitation (i.e., reduced availability of optimum-sized carrion), pesticides, disease, light pollution, interspecific competition for carcasses, or a combination of these factors. The primary cause, however, has been attributed to habitat loss and fragmentation (Service 1991a, 2005a).

Reasonably foreseeable actions that may adversely affect American burying beetle habitat in the proposed Permit Area, in addition to those generally discussed above, are related to the existing threats to the species. The TWC indicates that human populations in the Northeast Texas Region, which includes Lamar and Red River counties, the State Planning Region containing American burying beetle habitat in the Permit Area, increased by 4.0 percent from 2000 to 2008 (TWC 2009). Further growth is anticipated from 2008 to 2040, with a projected population increase of 1.1 percent (TWC 2009). To accommodate this growth, increased residential and commercial development would likely occur. Such projects would also likely lead to the construction of more roads, utilities, and infrastructure appurtenances. Construction activities may directly impact suitable habitat through habitat fragmentation or destruction. Increased abundance of domestic animals may reduce carrion availability for the American burying beetle, where populations occur proximal to human populations. However, compared to estimated population growth rates elsewhere throughout the proposed Permit Area over this time period, this represents a relatively stable human population trend, which may suggest impacts due to residential development may be low.

As such, incidental take under the proposed HCP is not likely to contribute significantly to cumulative impacts on the status and recovery of the American burying beetle. Furthermore, avoidance, minimization, and conservation measures and BMPs established under the Conservation Program (Section 6) of this HCP will minimize the intensity and duration of impacts to the American burying beetle. Mitigation measures proposed to offset these impacts will likely further the recovery of the species through mechanisms, including but not limited to, land conservation and management activities to promote the status of the species or address vast uncertainties regarding its ecology (e.g., distribution and abundance), biology (e.g., population dynamics), and conservation.

5.4.3.6 Cumulative Impacts on the Houston Toad

Since 1989, the Houston toad has been documented in ten Texas counties, of which six are within the proposed Permit Area: Bastrop, Freestone, Lee, Leon, Milam, and Robertson (Service 2010, Yantis 1989, 1990, 1991, Yantis and Price 1993), although the current status of the Houston toad in Freestone County is uncertain. Current estimates put Houston toad abundance at 1,000 to 2,500 individuals with populations few, small, and declining (NatureServe 2010). The extent of suitable habitat and potential population range is currently unknown, as the specifics of habitat use by the Houston toad are only now becoming known and determination of such data is difficult given that much of it occurs on private property. More so, it has been 15 years since the last range-wide surveys were completed, and the status of the species in all but Bastrop County remains unclear. However, Houston toad researchers are doubtful that the toad remains in nine counties in Texas (Forstner 2006).

Under the proposed HCP, covered activities would result in impacts to 635 acres (257 hectares) of potential Houston toad habitat. Covered activities for existing facilities would directly impact 411 acres (166 hectares). For new facilities, covered activities would directly impact 213 acres (86 hectares) and indirectly impact 11 acres (4 hectares). Avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this HCP would minimize the extent of incidental take within the proposed Permit Area.

A determination of past and currently authorized Federal actions that have impacted or will impact the Houston toad was completed through query of the Service's Southwest Ecological Service Electronic Library (Service 2010) and Environmental Conservation Online System (Service 2010), and other references. Permitted incidental take through the section 10(a)(1)(B) process has occurred or is requested for the following Federal Actions:

- **46-Subdivision EA/HCP:** Developed by the Service's Austin Ecological Service Field Office to support individual section 10(a)(1)(B) permit applications by private landowners in 46 existing subdivisions platted before 1995 in Bastrop County for impacts to low- and medium-quality habitat (2 and 44 subdivisions, respectively) from construction and occupation of single-family residences and other similar structures on up to 0.5-acre (0.2-hectare) tracts. Permits originally were approved on August 28, 2000, and revised on July 10, 2001. Incidental take was authorized for approximately 6,609 undeveloped acres (2,675 hectares) at the time they were approved (Service 2001).
- **Boy Scouts of America EA/HCP for Griffith League Ranch:** A section 10(a)(1)(B) permit was issued to the Capital Area Council #564 of the Boy Scouts of America on November 5, 2003, for development of a "high adventure" Boy Scout camp on the 4,848-acre (1,962-hectare) Griffith League Ranch in north-central Bastrop County. Permitted incidental take included effects from high- or medium- impact land uses to 914 acres (370 hectares), with low impacts to the remaining area (Boy Scouts of America and Service 2003).
- **Utility HCP:** A section 10(a)(1)(B) incidental take permit was issued to the Aqua Water Supply Corporation, the Lower Colorado River Authority (LCRA), and Bluebonnet Electric Cooperative, Inc., and Austin Energy (collectively "the Utilities") on August 19, 2005. Authorized activities include the maintenance, repair, upgrade, and new installation of linear facilities and fixed-foundation facilities that will impact approximately 6,972 acres (2,749 hectares) of the Permit Area. The extent of Houston Toad habitat that would be impacted was not determined, and mitigation will be provided for all impacts over the 30-year permit duration (SWCA 2005).
- **Lost Pines HCP:** Bastrop County completed the Lost Pines HCP to support an application to the Service for a section 10(a)(1)(B) permit for incidental take of the Houston toad. Activities requesting authorization within the Permit Area include land development, agricultural practices, silvicultural practices, and certain other land-use activities within the approximately 124,000-acre (50,181-hectare) plan area in Bastrop County. Moreover, the HCP would include the 46 subdivisions currently covered under the Service's 46-Subdivision EA/HCP and 10(a)(1)(B) permits referenced above. The purpose of the HCP is to simplify and streamline the compliance process. Upon issuance of the incidental take permit, the Service would either dissolve the 46-Subdivision EA/HCP or let it expire. Incidental take is requested for high impact, long-term loss

of 5,736 acres (2,321 hectares) of Houston toad habitat and low-impact land management activities on 108,000 acres (43,706 hectares). An additional estimate of past habitat loss/degradation within the plan area of 48,892 acres (19,786 hectares) is provided (Loomis Austin 2007).

Recovery criteria for delisting, as provided in the species' recovery plan, are based on protecting its known populations and habitats, locating and protecting additional natural populations and habitats, determining its taxonomic status with respect to other forms of *Bufo*, and introducing and establishing self-sustaining wild populations on sites in its historic range (Service 1984b). At present, protected reserves for the Houston toad include, but are not exclusive to, Bastrop (5,926 acres [2,398 hectares]) and Buescher state parks (1,017 acres [412 hectares]) and Safe Harbor Agreements with the Boy Scouts of America (500 acres [202 hectares]), Robert K. Long (540 acres [219 hectares]), Small Family Investments (836 acres [338 hectares]), and Gulf Coast Prairies, known as the Coastal Prairie Conservation Initiative (Service 2010). Although protection has been placed on several populations and habitats and funding provided for research and monitoring, further conservation, research, and monitoring is needed. The Service is currently partnering with Environmental Defense Fund to develop a programmatic Safe Harbor Agreement for the entire range of the Houston toad to encourage landowner participation in Houston toad recovery efforts within and outside of Bastrop County to promote private land management and monitoring activities.

Although it is impossible to determine the cumulative impacts to Houston toad habitat from currently authorized Federal actions referenced above and actions proposed under this HCP, it is clear that most known populations of Houston toads occur on protected lands and that various conservation mechanisms are in place to sustain and recover this species. Furthermore, mitigation under the aforementioned Federal actions, and those proposed for this HCP, will provide net benefits to the recovery and status of the species in the wild. Albeit, unknown and thus unquantifiable, impacts from past and current actions conducted on private lands that lack a Federal nexus or are unauthorized, such as the degradation and previous habitat loss estimates provided in the Lost Pines HCP, may negatively impact the species, the extent to which it is unknown. Although Bastrop State Park supports a large number of Houston toads, much of the Houston toad habitat and population lies on private lands, and activities therein may also account for significant adverse impact. Primary threats to this species include destruction, conversion, and fragmentation of habitat throughout its range as a result of urbanization, logging, and agricultural production (Service 1995a), as well as, concurrent increases in introduced pathogens (including pesticides), and predation, coupled with the severe effects of the 1950s drought (Loomis Austin 2007). Extreme drought conditions throughout central Texas and the Houston Toads range from 2008 to 2009 may have had adverse impacts on the species, given the reduction of breeding habitat and impacts on juveniles from such events.

Reasonably foreseeable actions that may adversely affect Houston toad habitat in the Permit Area, in addition to those generally discussed above, are related to the existing threats to the species. The TWC indicates the human populations in the Brazos Valley Region (includes Leon and Robertson counties),

Capital Region (includes Bastrop and Lee counties), Central Texas Region (includes Milam County), and Heart of Texas Region (includes Freestone County), State Planning Regions containing Houston toad habitat in the Permit Area, increased by 9.2, 26.4, 12.4, and 5.7 percent, respectively, from 2000 to 2008 (TWC 2009). To accommodate this growth, increased residential and commercial development and habitat conversion would likely occur. Increased human populations within the range of the species may result in greater demand from groundwater and surface water resources. Groundwater drawdown may consequently alter the hydroperiod of waterbodies used for breeding, degrading their suitability for the Houston toad. Should projections of climate change that suggest drier temperatures, higher evapotranspiration rates, and less precipitation, leading to more arid conditions, be realized in the proposed Permit Area, cumulative adverse impacts from these activities could be compounded. Although the extent to which these actions will impact the Houston toad is unknown, it would be reasonable to assume that they may result in a cumulative loss of Houston toad habitat.

Respective of past, current, and reasonably foreseeable Federal and nonfederal actions within the proposed Permit Area, it is unlikely that covered activities under the proposed HCP will contribute significantly to cumulative impacts on the recovery and survival of the Houston toad. Previously authorized actions where a no jeopardy determination was made will or have impacted a much greater habitat area than anticipated for covered actions in this HCP. Furthermore, the impact of the covered activities on their own will not be greater than in conjunction with these past and current activities. Covered actions would be in response to development and population growth rather than promote these activities. Although covered activities would contribute to cumulative impacts to Houston toad within the proposed Permit Area, the contribution would be negligible compared to other actions within the area. Additionally, implementation of BMPs described in this HCP and mitigation actions established in the Conservation Plan (Section 6) would further reduce potential contribution of covered activities to cumulative impacts within the proposed Permit Area.

5.4.3.7 Cumulative Impacts on the Whooping Crane

As previously discussed, the proposed Permit Area is intersected by the approximately 2,400-mile (3,862 kilometer)-long migration corridor for the only self-sustaining whooping crane population, the Aransas-Wood Buffalo Population (AWBP). Given the opportunistic nature of whooping crane stopover and low observation numbers, it is difficult to predict exactly where within Permit Area the species may occur. The Service (2010) lists occurrence within 55 counties in the proposed Permit Area, and efforts to predict likely stopover locations were completed to prioritize minimization and mitigation measures for this HCP (see Appendix). As of September 2010, the AWBP is estimated at 263 birds (242 adults in 78 pairs and 21 young) (Whooping Crane Conservation Association 2010).

Collision with power lines and other utilities has resulted in the largest known occurrence of fledgling mortality. No such mortality has been recorded for the Applicant's existing facilities. Nonetheless, covered activities could result in the incidental take of approximately one individual whooping crane over the permit duration, and as such, a commensurate request for incidental take authorization for one

individual is included in this HCP. Implementation of avoidance, minimization, and mitigation measures established in the Conservation Program (Section 6) of this document will reduce and compensate for incidental take within the proposed Permit Area.

Recovery criteria for downlisting as provided in the species' recovery plan are based on achieving one of three scenarios: 1) a minimum of 40 productive pairs in the AWBP, and 25 productive pairs in each of two additional self-sustaining populations, 2) a minimum of 100 productive pairs in the AWBP and 30 productive pairs in a second self-sustaining population, or 3) a minimum of 250 productive pairs in the AWBP and at least 21 productive pairs in the captive population (Service 2007). As of July 2010, the total wild population was estimated at 383 with the AWBP being the only self-sustaining wild population. Although whooping cranes have responded positively to some conservation efforts, continued monitoring is needed to gauge success towards reaching recovery requirements. Primary threats to this species include present or threatened destruction, modification, or curtailment of habitat or range, as a result of expanding human developments, and water diversions for agricultural production (Service 2010), as well as, global warming and associated climate changes, human disturbance, natural and introduced diseases, parasites, food availability, severe weather and predation of eggs and chicks on the nesting grounds (Service 2010).

Adverse impacts to the whooping crane from actions proposed under this HCP would be minor to moderate in regards to whooping crane recovery. According to the 2004 population viability analysis done for the AWBP, the population would show a significant drop in probability of persistence (i.e., probability of species survival) if a 3 percent increase in absolute mortality were to occur (Reed 2004). With current flock size estimates at 383 individuals, a 3 percent increase in absolute mortality equates to less than 12 birds annually. An increase in absolute mortality of 3 percent added to the current mortality rate from existing sources would cause the AWBP to become a nonviable population with a probability of persistence (200 years into the future) predicted to be 86 percent (Reed 2004). A viable population is defined as having a >95 percent probability of persisting 200 years (Reed 2004). It should be noted that mortality in such a small population also represents a loss of genetic material and a setback for recovery efforts (Service 2009a).

A determination of past and currently authorized Federal actions that have impacted or will impact the whooping crane was completed through query of the Service's Southwest Ecological Service Electronic Library (Service 2010) and Environmental Conservation Online System (Service 2010), and other references. The only Federal action on record was for the establishment of a safe harbor agreement for the Coastal Prairie Coalition (GLCI) Grazing Lands Conservation Initiative, which includes private lands in Aransas, Austin, Calhoun, Colorado, Galveston, Goliad, Refugio, and Victoria counties (Permit TE-151746 issued 24 July 2007) (Service 2010). Designation of important stopover, rearing, and wintering areas as critical habitat (43 *Federal Register* 20938, 15 May 1978), although outside of the proposed Permit Area, provides some protection to the species through Federal regulations. Much of the suitable habitat within the proposed Permit Area exists on private properties, where most activities lack a Federal nexus, and as such may have and may continue to negatively impact the whooping crane through habitat

modification and human disturbance. Though, the extent to which such activities have or will affect the species is unattainable.

Reasonably foreseeable actions that may adversely affect the whooping crane in the Permit Area, in addition to those generally discussed above, are related to the existing threats to the species. The current level of existing wind energy development within the migration corridor of the AWBP is increasing. Although the majority of wind farms that are being constructed in Canada lie outside of the migration corridor, the Service has not independently tabulated the number of wind farms operating, under construction, or proposed in the seven states within the U.S. portion of the migration corridor. The Department of Energy, Western Area Power Administration (WAPA) figures indicate that approximately 2,433 known wind turbines have been constructed in the United States portion of the whooping crane corridor, with another 1,355 proposed for construction in the near to midterm future that will be connected to the Federal power grid (WAPA 2007).

Additionally, the projected population growth within the Permit Area over the permit duration (see EIS) and accompanying development of residential, commercial, transportation and utility infrastructure with related appurtenance would have further negative impacts on the status and recovery of the species. Increased development may lead to greater water consumption and depletion of surface and groundwater resources in the proposed Permit Area. Reductions in water availability may have drastic negative impacts on the availability of suitable stopover locations, cumulatively increasing the impact that subsequent independent activities have on whooping cranes in the proposed Permit Area. Should projections of climate change that suggest drier temperatures, higher evapotranspiration rates, and less precipitation, leading to more arid conditions, be realized in the proposed Permit Area, cumulative adverse impacts from these activities could be compounded.

Given uncertainties regarding the extent of suitable habitat stopover habitat, the species' distribution and frequency of occurrence within the proposed Permit Area, and the disturbance thresholds at which cumulative impacts have substantial effects on the population, the assessment of cumulative effects from the proposed HCP is difficult. However, respective of past, current, and reasonably foreseeable Federal and nonfederal actions within the proposed Permit Area, it is unlikely that covered activities, which could result in the mortality of an individual whooping crane under the proposed HCP, would have cumulative detrimental impacts on the recovery and survival of the whooping crane. Covered actions would be in response to development and population growth rather than promote these activities, and such activities would likely have a greater impact than covered activities on the species. Furthermore, the impact of the covered activities on their own will not be greater than in conjunction with these past and current activities. Future construction of electric utilities not covered under this HCP would most often have a Federal nexus, and as such, require Section 7 consultation. Mitigation measures should decrease the probability of whooping crane collision with electric facilities in high probability areas. Although covered activities would contribute to cumulative impacts to whooping crane within the proposed Permit Area, the contribution would be negligible compared to other actions within the area. Additionally, implementation of BMPs described in this HCP and mitigation actions established in the Conservation

Plan (Section 6) would further reduce potential contribution of covered activities to cumulative impacts within the proposed Permit Area.

5.4.3.8 Cumulative Impacts on the Golden-Cheeked Warbler

Of all the bird species known to occur in Texas, only the golden-cheeked warbler nests exclusively within the state's boundaries (Ladd and Gass 1999). The golden-cheeked warbler historically nested in 41 of Texas' 254 counties (Pulich 1976, Service 1996). Current confirmed breeding records exist from 26 Texas counties, 10 of which are within the proposed Permit Area, as discussed in Section 3. In the recovery plan for the golden-cheeked warbler, the recovery strategy includes the protection of sufficient breeding habitat to ensure the continued existence of at least one self-sustaining population, viable either on its own or through connection with other populations, within each of eight defined recovery regions (Service 1992b). The definition of a viable population is not established within the recovery plan, though it is suggested to include from 500 breeding pairs to several thousand individuals. More recent review, however, indicates that the minimum requirement may be as many as 3,000 breeding pairs (Alldredge et al. 2002, Service 1996).

Breeding golden-cheeked warbler population and habitat availability estimates differ greatly between assessments, with variance largely based on the methods employed and the extent and state time at which habitat is assessed. For example, range wide habitat suitability estimates for the golden-cheeked warbler between two commonly referenced models (Loomis Austin 2009, SWCA 2007) differ by nearly 2.8 million acres (1.1 million hectares). The most commonly referenced and reviewed contemporary models for golden-cheeked warbler range wide habitat include Diamond (2007) Model C, Loomis Austin (2008), and SWCA (2007), with range wide habitat estimates of 4,378,418 acres (1,771,883 hectares), 4,149,478 acres (1,679,234 hectares), and 1,363,807 acres (551,913 hectares), respectively. The most recent model proposed was developed by Morrison et al. 2010 (Model III) and is stated by its authors to be the most accurate, estimating 2,778,208 acres (1,124,301 hectares) of available habitat, but has not undergone substantial review.

Under the proposed HCP, covered activities would result in impacts to 2,997 acres (1,213 hectares) of potential golden-cheeked warbler habitat: 1,252 acres (507 hectares) of direct impacts and 1,745 acres (706 hectares) of indirect impacts. As such covered activities would impact approximately from 0.07 to 0.22 percent of suitable habitat within the species' breeding range (Table 5-13). Assuming all impacted potential habitat is occupied at a range of 5 to 20 acres per breeding pair, this would equate to impacting habitat that supports from approximately 150 to 600 breeding pairs. An approximation of impacts by breeding territories is provided in Table 5-13 based on recent survey data from Morrison et al. 2010. Across affected recovery regions, the highest anticipated impact would be in Recovery Region 1, where 2.36 percent of breeding territories would be affected. However, across recovery regions, most impacts incurred will be indirect. Further, assessed impacts to breeding territories are likely overestimates given the assumption that most habitat patches will be moderate to high quality. Avoidance, minimization, and

conservation measures and BMPs established by the Conservation Program (Section 6) of this HCP would minimize the extent of incidental take within the proposed Permit Area.

Table 5-13. Cumulative Impacts of HCP Requested and Past Authorized Incidental Take of Golden-Cheeked Warbler Habitat on Territories Across Its Breeding Range

Recovery Region	Predicted GCW Territories ¹	HCP Direct Impacts		HCP Indirect Impacts		HCP Total Impacts			
		High Number of Territories Impacted ²	Low Number of Territories Impacted ³	High Number of Territories Impacted ²	Low Number of Territories Impacted ³	High Total ²	% of Territories	Low Total ³	% of Territories
1	5,940	71	18	70	17	140	2.36	35	0.59
2	8,613	82	20	105	26	187	2.17	47	0.54
3	15,151	84	21	122	31	206	1.36	52	0.34
4	20,471	7	2	26	7	33	0.16	8	0.04
5	31,519	7	2	26	7	33	0.11	8	0.03
Total	81,694	251	63	349	87	600	6.16	150	1.54

¹ Source: Morrison et al. (2010).

² Assumes 5 acres per golden-cheeked warbler territory in occupied habitat impacted by covered activities.

³ Assumes 20 acres per golden-cheeked warbler territory in occupied habitat impacted by covered activities.

A determination of past and currently authorized Federal actions that have impacted or will impact the golden-cheeked warbler was completed through query of the Service’s Southwest Ecological Service Electronic Library (Service 2010) and Environmental Conservation Online System (Service 2010), in addition to other references, including but not limited to, other HCPs within or near the proposed Permit Area. Based on this review, incidental take of approximately 49,800 acres (20,153 hectares) of golden-cheeked warbler habitat has been authorized to date. The cumulative impacts of take requested under this HCP and previously authorized take are presented in Table 5-14. Given the uncertainties surrounding the numerous models predicting suitable habitat across the species’ breeding range in Texas, these impacts are evaluated in relation to the aforementioned habitat models to provide an estimated range. In doing so, the estimated cumulative impact to golden-cheeked warbler habitat from incidental take requested under this HCP and past authorized projects would be from 1.21 to 3.87 percent of estimated range-wide breeding habitat in Texas. These estimates do not include future federally authorized projects, which will require their own HCP and assessment of cumulative impacts, or unauthorized loss of habitat on private lands, which cannot be evaluated.

Reasonably foreseeable actions that may adversely affect golden-cheeked warbler habitat in the Permit Area, in addition to those generally discussed above, are related to the existing threats to the species. Estimates of currently authorized incidental take of golden-cheeked warbler habitat do not include the Hays County and Comal County RHCPs, which are anticipated to authorize impacts to an additional 9,000 acres (3,642 hectares) and 5,238 acres (2,120 hectares), respectively. Human population growth is anticipated over the permit duration within counties containing golden-cheeked warbler habitat. The TWC indicates that human populations in the Capital Region (includes Burnet County), the Central Texas Region (includes Bell, Coryell, and Lampasas counties), the Heart of Texas Region (includes Bosque County), and the North Central Texas Region (includes Erath, Johnson, Palo Pinto, and Somervell

counties), State Planning Regions supporting breeding golden-cheeked warbler populations, increased by 26.4, 12.4, 5.7, and 19.9 percent, respectively, from 2000 to 2008 (TWC 2009). Continued growth is anticipated from 2008 to 2040, with projected population increases of 65.6, 44.2, 26.9, and 62.4 percent, respectively (TWC 2009). To accommodate this growth, increased residential and commercial development and habitat conversion would likely occur. Although the extent to which these actions will impact the golden-cheeked warbler habitat is unknown, it would be reasonable to assume that they may result in a cumulative loss of golden-cheeked warbler habitat.

Table 5-14. Cumulative Impacts of HCP Requested and Past Authorized Incidental Take of Golden-Cheeked Warbler Habitat Across Its Breeding Range

Model	Acres (Hectares) of Breeding Habitat in Texas		Acres (Hectares) of Take Requested in HCP		% of Total Habitat	Acres (Hectares) of Previously Authorized Take ²		% of Total Habitat	Acres (Hectares) of HCP and Previously Authorized Take		% of Total Habitat
Diamond (2007) Model C	4,378,418	(1,771,883)	2,997	(1,213)	0.07	49,800	(20,153)	1.14	52,797	(21,366)	1.21
Loomis Austin (2008)	4,149,478	(1,679,234)	2,997	(1,213)	0.07	49,800	(20,153)	1.20	52,797	(21,366)	1.27
SWCA (2007)	1,363,807	(551,913)	2,997	(1,213)	0.22	49,800	(20,153)	3.65	52,797	(21,366)	3.87
Morrison et al. (2010)	2,778,208	(1,124,301)	2,997	(1,213)	0.11	49,800	(20,153)	1.79	52,797	(21,366)	1.90

¹ Source: SWCA 2010 review to September 2007 with updated data from Service's Southwest Region Electronic Library (Service 2010).

Respective of past, current, and reasonably foreseeable Federal and nonfederal actions within the proposed Permit Area, it is unlikely that covered activities under the proposed HCP would contribute significantly to cumulative impacts on the recovery and survival of the golden-cheeked warbler. Previously authorized actions where a no jeopardy determination was made will or have impacted a much greater habitat area than anticipated for covered actions in this HCP. Furthermore, the impact of the covered activities on their own will not be greater than in conjunction with these past and current activities. Avoidance and minimization of impacts with mitigation for unavoidable impacts through purchase of conservation credits that promote the recovery of the species will have net benefits. Although covered activities would contribute to cumulative impacts to golden-cheeked warbler within the proposed Permit Area, the contribution would be negligible compared to other actions within the area. Additionally, implementation of BMPs described in this HCP and mitigation actions established in the Conservation Plan (Section 6) would further reduce potential contribution of covered activities to cumulative impacts within the proposed Permit Area.

5.4.3.9 Cumulative Impacts on the Black-Capped Vireo

The present known breeding range of the black-capped vireo extends from central Oklahoma through Dallas, the Edwards Plateau, Concho Valley, Callahan Divide, and Big Bend National Park in Texas, to the Mexican states of Coahuila, Nuevo Leon, and Tamaulipas, with 4 percent of the known breeding

population occurring in Mexico (Wilkins et al. 2006). Within the proposed Permit Area, this range extends across 43 counties with known breeding pairs in 39 of these (Gryzbowski 1995, Lockwood and Freeman 2004, Pulich 1988, Service 1995a, 2004b, 2010a, Sexton et al. 1989, Wilkins et al. 2006, Omar Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2010, D. Green and G. Newgord, PBS&J, pers. observations).

Although the amount and distribution of suitable breeding habitat was a major factor contributing to the species' listing (Service 1991b), the extent of such habitat was unknown at that time. Subsequent efforts to assess habitat availability have suggested a much greater availability than previously assumed. No inventory exists through which to reliably estimate trends in suitable black-capped vireo habitat. As discussed previously, one assessment estimated 1.45 million acres (587,794 hectares) of suitable breeding habitat across Texas (Service 2004g), although this estimate may lack reliability due to sampling issues (Service 2007, Wilkins et al. 2006). More recent surveys support that the breeding population of black-capped vireos is substantially greater than assumed when the species was listed. The estimated breeding population in 2005 was 5,996 males in the U.S. population and at total of 6,269 including Mexico (Wilkins et al. 2006). Due largely to these factors addressed in a status review of this species on 19 June 2007, the Service recommended that the black-capped vireo be downlisted from endangered to threatened (Service 2007).

Under the proposed HCP, covered activities would result in impacts to 5,714 acres (2,313 hectares) of potential black-capped vireo habitat. Covered activities for existing facilities would directly impact 1,292 acres (523 hectares). For new facilities, covered activities would directly impact 931 acres (377 hectares) and indirectly impact 3,491 acres (1,413 hectares). As such covered activities would impact approximately 0.39 percent of suitable habitat within the species' breeding range (Table 5-15). Assuming all impacted potential habitat is occupied at a range of 2.5 to 25 acres per breeding pair, this would equate to impacting habitat that supports from approximately 229 to 2,286 breeding pairs. An approximation of impacts by breeding territories is provided in Table 5-16 based on the estimated number of males within the U.S. (Wilkins et al. 2006). It is important to note that that the anticipated impact would likely be closer to the low territory density impact estimate, given the avoidance of known occupied or potential habitat and lands currently managed for the species. Most impacts incurred will be indirect. Further, assessed impacts to breeding territories are likely to be overestimates given the uncertainty regarding the total extent of suitable habitat within the species breeding range (Wilkins et al. 2006, Service 2007) added the unknown but anticipated high amount of potential habitat assumed to be occupied, and mitigated for accordingly, where in fact it is not. Avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this HCP would minimize the extent of incidental take within the proposed Permit Area.

A determination of past and currently authorized Federal actions that have impacted or will impact the black-capped vireo was completed through query of the Service's Southwest Ecological Service Electronic Library (Service 2010) and Environmental Conservation Online System (Service 2010), in addition to other references, including but not limited to, other HCPs within or near the proposed Permit

Area. Based on this review, incidental take of approximately 7,709 acres (3,120 hectares) of black-capped vireo habitat has been authorized to date. The cumulative impacts of take requested under this HCP and previously authorized take are presented in Table 5-15 below. Given the uncertainties surrounding the numerous models predicting suitable habitat across the species' breeding range in Texas, these impacts are evaluated in relation to the aforementioned Service 2004g estimated range. In doing so, the estimated cumulative impact to black-capped vireo habitat from incidental take requested under this HCP and past authorized projects would be equate to approximately 0.93 percent of estimated range-wide breeding habitat in Texas. These estimates do not include future federally authorized projects, which will require their own HCP and assessment of cumulative impacts, or unauthorized loss of habitat on private lands, which cannot be evaluated.

Table 5-15. Cumulative Impacts of HCP Requested and Past Authorized Incidental Take of Black-Capped Vireo Habitat Across Its Breeding Range¹

Species	Acres (Hectares) of Breeding Habitat in Texas ²	Acres (Hectares) of Take Requested in HCP	% of Total Habitat	Acres (Hectares) of Previously Authorized Take	% of Total Habitat	Acres (Hectares) of HCP and Previously Authorized Take	% of Total Habitat
Black-Capped Vireo	1,450,000 (586,794)	5,714 (2,313)	0.39	7,709 (3,120)	0.53	13,423 (5,432)	0.93

¹ Source: SWCA 2010 review to September 2007 with updated data from Service's Southwest Region Electronic Library (Service 2010).

² Source: Service 2004g

Table 5-16. Cumulative Impacts of HCP Requested and Past Authorized Incidental Take of Black-Capped Vireo Habitat on Territories Across Its Breeding Range¹

Species	Predicted Number of Territories in U.S. ¹	HCP Direct Impacts		HCP Indirect Impacts		HCP Total Impacts			
		High Number of Territories Impacted ²	Low Number of Territories Impacted ³	High Number of Territories Impacted ²	Low Number of Territories Impacted ³	High Total ²	% of Territories	Low Total ³	% of Territories
Black-Capped Vireo	5,996	889	89	1,396	140	2286	38.12	229	3.81

¹ Source: Service (2004g).

² Assumes 2.5 acres per black-capped vireo in occupied habitat impacted by covered activities.

³ Assumes 25 acres per black-capped vireo territory in occupied habitat impacted by covered activities.

In addition to federally authorized projects that will result in the incidental take of black-capped vireo habitat, numerous conservation programs on Federal and private lands have been enacted in the past with achieved or predicted measurable benefits for the species. A safe harbor agreement was established in December 2000 by Environmental Defense, a private nonprofit environmental organization, for protection and restoration of black-capped vireo and golden-cheeked warbler on Texas private lands. At the time of issuance, the agreement covered 25 counties in Texas, and was amended in 2005 to include 12 additional counties. The Environmental Defense also operates a Landowner Assistance Program to assist in management and restoration activities on private lands. In 2007, approximately 6,200 acres (2,509 hectares) have been enrolled by seven landowners in six counties. Formal consultation by the

NRCS with the Service in December 2004 regarding brush management activities related to the 2002 Farm Bill created guidelines to reduce encroachment of woody species, such as Ashes juniper, in black-capped vireo habitat and reduce potential impacts to the species. Additional Federal and state programs that have and continue to promote the recovery of the species in the Permit Area include the Service's Partners for Fish and Wildlife and the Texas Parks and Wildlife Department Landowner Incentive Program, which together as of 2007 had restored or enhanced over 12,400 acres (5,018 hectares) of black-capped vireo habitat. Protection for the species is also afforded by the active management and/or conservation measures on Federal and nonfederal lands. Specifically, approximately 75 percent of the known black-capped vireo population occurs on four well-surveyed areas: Fort Hood Military Reservation (Texas), Kerr Wildlife Management Area (Texas), Wichita Mountains Wildlife Refuge (Oklahoma), and Fort Sill Military Reservation (Oklahoma) (Service 2007, Wilkins et al. 2006). Additionally, the Balcones Canyonlands National Wildlife Refuge was established in 1992 in Burnet, Travis, and Williamson counties to protect and manage land for the black-capped vireo and golden-cheeked warbler, with hopes of attaining at least 46,000 acres (18,616 hectares) of habitat. Given these conservation and restoration programs on Federal, state, and private lands, substantial protection is provided to the black-capped vireo within the proposed Permit Area.

Reasonably foreseeable actions that may adversely affect black-capped vireo habitat in the Permit Area, in addition to those generally discussed above, are related to the existing threats to the species. Estimates of currently authorized incidental take of black-capped vireo habitat do not include the Hays County and Comal County RHCPs, which are anticipated to authorize impacts to an additional 1,300 acres (526 hectares) and 1,000 acres (405 hectares), respectively. Human population growth is anticipated over the permit duration within counties containing black-capped vireo habitat (see EIS). To accommodate this growth, increased residential and commercial development and habitat conversion would likely occur. Furthermore, perceivable threats based on past trends include habitat conversion and land use change (specifically loss of rangeland), increased browsing by wild game and exotics, and juniper encroachment and habitat degradation. Increased urbanization may further repress the frequency of fire, which would negatively impact habitat availability. Although the extent to which these actions will impact the black-capped vireo habitat is unknown, it would be reasonable to assume that they may result in a cumulative loss of black-capped vireo habitat.

Respective of past, current, and reasonably foreseeable Federal and nonfederal actions within the proposed Permit Area, it is unlikely that covered activities under the proposed HCP would contribute significantly to cumulative impacts on the recovery and survival of the black-capped vireo. Impacts from the covered activities on their own will not be greater than in conjunction with past and current activities previously discussed. Covered actions would be in response to development and population growth rather than promote these activities. Avoidance and minimization of impacts with mitigation for unavoidable impacts through purchase of conservation credits that promote the recovery of the species will have net benefits. Although covered activities would contribute to cumulative impacts to black-capped vireo within the proposed Permit Area, the contribution would be negligible compared to other actions within the area. Additionally, implementation of BMPs described in this HCP and mitigation

actions established in the Conservation Plan (Section 6) would further reduce potential contribution of covered activities to cumulative impacts within the proposed Permit Area.

5.4.3.10 Cumulative Impacts on the Red-Cockaded Woodpecker

Although the red-cockaded woodpecker historically occurred from Texas, primarily east of the Trinity River, to the Atlantic seaboard and as far north as Maryland (Hooper et al. 1980), the species' current range is limited to the southeastern U.S. from Virginia south to Florida and west to Oklahoma and Texas (Jackson 1994). Within Texas, the species occurs in 16 to 17 counties (Lockwood and Freeman 2004, Service 2010), of which four (Angelina, Houston, Nacogdoches, and Cherokee counties) are located in the eastern extent of the proposed Permit Area. Known populations of red-cockaded woodpeckers in Texas primarily occur on state and Federal lands (88 percent), mostly on national forests, with very few known active colonies on private lands. Statewide, the status of the species has been improving with an estimated 374 active clusters in Texas at present as a result of an estimated 8 percent increase over the preceding 4 years (Omar Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2010). Red-cockaded woodpecker populations in the proposed Permit Area and elsewhere in the east Texas Pineywoods are included in the West Gulf Coast Plain Recovery Unit of the species' recovery plan, the boundary at which assessment of jeopardy is also suggested (Service 2003b).

Under the proposed HCP, covered activities would result in impacts to 514 acres (208 hectares) of suitable red-cockaded woodpecker foraging habitat. Covered activities for existing facilities would directly impact 247 acres (100 hectares). For new facilities, covered activities would directly impact 56 acres (23 hectares) and indirectly impact 211 acres (85 hectares). Avoidance, minimization, and conservation measures and BMPs established by the Conservation Program (Section 6) of this HCP would minimize the extent of incidental take within the proposed Permit Area.

A determination of past and currently authorized Federal actions that have impacted or will impact the red-cockaded woodpecker was completed through query of the Service's Southwest Ecological Service Electronic Library (Service 2010), Environmental Conservation Online System (Service 2010), and other references. The only recorded action found was the issuance of an agreement for the establishment of the East Texas Pineywoods Safe Harbor program approved in early 1998. The program is administered by the Texas Parks and Wildlife Department and Texas Forest Service and was established to encourage and facilitate the restoration of foraging and nesting red-cockaded woodpecker habitat on private lands in east Texas. As of March 2004, 18 landowners had enrolled 14,954 acres and four new red-cockaded woodpecker groups (in addition to baseline) had been established (Environmental Defense Fund 2010). Active clusters on Federal lands in the proposed Permit Area (e.g., Davy Crockett and Angelina national forests) are provided protection Section 7(a)(1) ESA requirements to assist in endangered species conservation. Active colonies also occur on state lands (e.g., Jones State Forest), private industrial forest lands (e.g., Temple-Inland), and private nonindustrial forestlands. These populations are afforded different levels of protection, and depict population trends ranging from increasing to decreasing (Rudolph et al. 2004). Past activities have resulted in the believed extirpation of red-cockaded

woodpeckers from several Federal and non-Federal locations in Texas but outside of the proposed Permit Area, such as Big Thicket National Preserve and the Alabama-Coushatta Indian Tribe Lands (Rudolph et al. 2004). Unauthorized impacts to red-cockaded nesting and foraging habitat have likely occurred in the past in Angelina, Houston, Nacogdoches, and Cherokee counties. However, the location and extent of such past activities are unknown and impossible to account for in determining cumulative impacts.

Reasonably foreseeable actions that may adversely affect red-cockaded woodpecker habitat in the Permit Area, in addition to those generally discussed above, are related to the existing threats to the species. Primary existing threats include habitat fragmentation and degradation, beetle infestation, and disruption of the fire frequency. The TWC indicates that human populations in the Deep East Texas Region (includes Angelina, Houston, and Nacogdoches counties) and the East Texas Region (includes Cherokee County), State Planning Regions supporting red-cockaded woodpecker populations in the proposed Permit Area, increased by 4.4 and 17.9 percent, respectively, from 2000 to 2008 (TWC 2009). Continued growth is anticipated from 2008 to 2040, with projected population increases of 25.6 and 26.4 percent, respectively (TWC 2009). To accommodate this growth, increased residential and commercial development and habitat conversion would likely occur. Such projects would also likely lead to the construction of more roads, utilities, and infrastructure appurtenances, as well as increased fire suppression efforts to protect these structures. Although it is impossible to quantify the extent to which these actions will impact the red-cockaded woodpecker, it is reasonable to assume that they may result in a loss of red-cockaded woodpecker habitat.

Respective of past, current, and reasonably foreseeable Federal and nonfederal actions within the proposed Permit Area, it is unlikely that covered activities under the proposed HCP would contribute significantly to cumulative impacts on the recovery and survival of the red-cockaded woodpecker. Covered actions would be in response to development and population growth rather than promote these activities, and such activities would likely have a much greater impact than covered activities on the red-cockaded woodpecker. Furthermore, the impact of the covered activities on their own will not be greater than in conjunction with these past and current activities. Cumulative impacts could occur where covered activities reduce foraging habitat availability for an active colony with minimal adverse effects. However, subsequent clearing of this colony's habitat by unauthorized activities on private lands that then reduce foraging habitat below the threshold required for colony viability may then have negative cumulative effects. Although the possibility remains that this could occur, it is highly unlikely given that most known active colonies within the proposed Permit Area occur on Federal lands with active management for this species. Although covered activities would contribute to cumulative impacts to red-cockaded woodpecker within the proposed Permit Area, the contribution would be negligible compared to other actions within the area. Additionally, implementation of BMPs described in this HCP and mitigation actions established in the Conservation Plan (Section 6) would further reduce potential contribution of covered activities to cumulative impacts within the proposed Permit Area.

5.4.3.11 Cumulative Impacts on the Louisiana Black Bear

Although the Louisiana black bear is not believed to occur within the proposed Permit Area at present, past observations of bears indecipherable between the Louisiana and American black bear and the species' historic range do not preclude the possibility of the species occurring within this area over the permit duration. Barker et al. (2004) documented confirmed black bear sightings in 22 east Texas counties between 1977 and 2003, to which the Service (2010) documentations add an additional six counties. Of these 28 counties, thirteen are located within the proposed Permit Area. The current breeding range for the species, however, is not within the proposed Permit Area and is limited to two river basins in Louisiana (Texas Parks and Wildlife Department 2005). Protection extends to all black bears occupying the historical range of the Louisiana black bear are protected as threatened due to similarity of appearance (57 *Federal Register* 588, 7 January 1992).

Under the proposed HCP, covered activities would result in impacts to 194 acres (79 hectares) of potential Louisiana black bear habitat. Impacts would not occur for existing facilities. Avoidance, minimization, and conservation measures and BMPs would minimize the extent of incidental take from direct impacts and prevent indirect impacts within the proposed Permit Area.

A determination of past and currently authorized Federal actions that have impacted or will impact the Louisiana black bear was completed through query of the Service's Southwest Ecological Service Electronic Library (Service 2010) and Environmental Conservation Online System (Service 2010). In doing so, no authorized Federal actions were found on record. In 2009, the Service designated 1,195,821 acres (483,932 hectares) of critical habitat for the Louisiana black bear. The Service divided the almost 1.2 million acres of critical habitat into three units: Tensas River Basin, Upper Atchafalaya River Basin, and Lower Atchafalaya River Basin. All three units occur within the State of Louisiana (74 *Federal Register* 10349, 10 March 2009). Additionally, numerous Federal, state, and nonprofit conservation areas are established within the range of this species.

Recovery criteria for downlisting as provided in the species' recovery plan include three criteria: (1) at least two viable subpopulations, one each in the Tensas and Atchafalaya River Basins; (2) establishment of immigration/emigration corridors between the two subpopulations; and (3) protection of the habitat and the interconnecting corridors that support each of the two viable subpopulations that will be used as the justification for delisting (Service 1995a). Currently, the subpopulations of the Louisiana black bear occur outside of the proposed Permit Area; and are contained within the species' designated critical habitat, which will afford these populations some protection (74 *Federal Register* 10349, 10 March 2009).

Cumulative impacts from past activities in addition to those proposed under this HCP are not quantifiable given the unknown occurrence of the species within the proposed Permit Area. This estimate, if attainable, would not include unknown, and thus unquantifiable, impacts from past and current actions conducted on private lands that lack a Federal nexus or are unauthorized. The primary threat to the

Louisiana black bear at present is habitat destruction or habitat modification. Past activities related to agriculture, development, and other activities have reduced the amount of available habitat and increasingly fragmented remaining forested areas, which would have had negatively impacted the Louisiana black bear should it occur or have occurred in these areas. Further habitat losses could reduce bear populations below the minimum requirements for long-term viability (Service 1995a). However, the Louisiana black bear is not an old-growth forest species, nor can it survive in open cropland conditions. Normal silvicultural practices, such as timber harvest, can result in improved bear habitat. It is, therefore, believed that the principal threat to this bear is not from normal forest management, but from conversion of timbered tracts to agricultural use (*57 Federal Register* 588, 7 January 1992). Natural mortality factors include disease, cannibalism, drowning, improper maternal care, and climbing accidents. Direct mortality from human causes includes hunting; trapping; poaching; collisions with vehicles, trains, and farm equipment; electrocution; depredation/nuisance kills; disturbance (causing den abandonment); and accidents related to research (*57 Federal Register* 588, 7 January 1992).

Reasonably foreseeable actions that may adversely affect Louisiana black bear habitat in the proposed Permit Area, in addition to those generally discussed above, are related to the existing threats to the species. The TWC indicates that human populations within Permit Area counties within the range of this species increased from 2000 to 2008: the Northeast Texas Region (Region 5), which includes Delta, Hopkins and Lamar counties; increased by 4.0 percent from 2000 to 2008; the East Texas Region (Region 6), which contains Anderson, Cherokee, Rusk, and Smith counties, increased by 7.9 percent from 2000 to 2008; the Deep East Texas Region (Region 14), which contains Angelina and Nacogdoches counties, increased 4.4 percent from 2000 to 2008; and the Texoma Region (Region 22), which contains Fannin County, increased 8.6 percent from 2000 to 2008 (TWC 2009). Further growth is anticipated from 2008 to 2040, with a projected population increase of 1.1 percent for Region 5, 26.4 percent for Region 6, 25.6 percent for Region 14, and 13.4 percent for Region 22 (TWC 2009). To accommodate this growth, increased residential and commercial development would likely occur. Such projects would also likely lead to the construction of more roads, utilities, and infrastructure appurtenances. Construction activities may directly impact suitable habitat through habitat fragmentation or destruction.

Respective of past, current, and reasonably foreseeable Federal and nonfederal actions within the proposed Permit Area, it is unlikely that covered activities under the proposed HCP would contribute significantly to cumulative impacts on the recovery and survival of the Louisiana black bear. Covered actions would be in response to development and population growth rather than promote these activities. Mitigation measures proposed to offset impacts from covered activities will likely further the recovery of the species through mechanisms, including but not limited to, land conservation and management activities to promote the status of the species or address vast uncertainties regarding its ecology (e.g., distribution and abundance), biology (e.g., population dynamics), and conservation. Although covered activities would contribute to cumulative impacts to Louisiana black bear within the proposed Permit Area, the contribution would be negligible compared to other actions within the area. Additionally, implementation of BMPs described in this HCP and mitigation actions established in the Conservation

Plan (Section 6) would further reduce potential contribution of covered activities to cumulative impacts within the proposed Permit Area.

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6.0 CONSERVATION PROGRAM

The ESA requires that the conservation program of an HCP include measures to minimize and mitigate impacts to the covered species to the maximum extent practicable. The Applicant has identified many conservation measures, including BMPs, to protect covered species. The Applicant believes that these measures would also serve to minimize impacts to vegetation and wildlife, as well as to protect sensitive areas such as wetlands, surface waters, groundwater resources, riparian areas, and protected species other than the 11 covered species. These BMPs are designed to avoid/minimize potential impacts to covered species and, while some of them are standard practice for the Applicant, many are more comprehensive than, and would result in a major departure from, typical operating procedures. Adoption of the proposed BMPs would mean changes in management procedures for installation of new facilities and the operation and maintenance of existing facilities. The Applicant will mitigate for unavoidable adverse impacts to covered species that may occur as a result of covered activities. Taken together, these measures will effectively reduce the direct and indirect, short-term and long-term negative impacts to the covered species.

6.1 GOALS AND OBJECTIVES

Functionally, the conservation program helps avoid and minimize the impacts to federally listed species from incidental take, where possible, and mitigates for unavoidable negative impacts to the maximum extent practicable. The targets and mechanisms by which the HCP is structured provide a clearly defined framework for the assurance of program success, as demonstrated through a transparent process, and continued operation, through financial security and an adaptive management strategy. The HCP and proposed section 10(a)(1)(B) permit, in general, are designed to achieve the following goals:

- 1) **Streamline the ESA compliance process for the Applicant:** The conservation plan will reduce the financial, procedural, and temporal burden of regulatory compliance and allow the Applicant to more efficiently meet the energy demands of its customers, while protecting federally listed species through ESA compliance.
- 2) **Reduce the regulatory burden on the Service for ESA administration and enforcement:** The conservation plan will collectively address the incidental take of federally listed species by the Applicant's proposed activities over an extended 30-year period and across an expansive, multi-jurisdictional, 100-county proposed Permit Area. Impacts otherwise would be addressed on a project-by-project, species-by-species basis, which would create a regulatory burden, reduce efficiency, and increase costs because of the necessity to individually process section 10(a)(1)(B) permits and monitor compliance and mitigation.
- 3) **Conserve natural resources by conducting legal activities necessary for both sustaining communities and supporting economic development in an environ-**

mentally responsible manner: The HCP will provide a plenary framework that ensures covered activities both provide reliable electric utilities that support local communities and conserve natural resources to promote the services provided therein and the benefits derived by society.

The HCP is designed to meet these goals through a variety of mechanisms and planning strategies, which include the following core features:

- 1) Completing the biological objectives in order to achieve the biological goals, as described below.
- 2) Prescribing the conditions necessary for the Applicant to secure Service authorization for incidental take of covered species during future operations, maintenance, and new development (covered activities) within the proposed Permit Area.
- 3) Establishing and implementing a long-term agreement between the Applicant and the Service for the protection of federally listed endangered and threatened species and their habitat within the proposed Permit Area.

6.1.1 Biological Goals

In accordance with the Service's HCP Handbook Addendum (2000), biological goals are the broad, guiding principles for the operating conservation program of the HCP and provide the rationale behind the minimization and mitigation strategies (65 FR 35241). Biological goals are developed based on the overall conservation needs of the covered species and/or its habitat, available information on the species, and anticipated effects of the covered actions on the species. As such, the biological goals of this HCP for the operation, maintenance, and new construction activities covered under the proposed permit are as follows:

- 1) Promote and facilitate the conservation of the federally listed endangered large-fruited sand-verbena, Texas poppy-mallow, Navasota ladies'-tresses, American burying beetle, Houston toad, whooping crane, golden-cheeked warbler, black-capped vireo, red-cockaded woodpecker, and threatened Pecos sunflower and Louisiana black bear (Covered Species).
- 2) Avoid impacts to federally listed and candidate species and their habitats within the Permit Area, but not covered by the requested incidental take permit, to preclude take of such species and other adverse effects and impediments to their recovery from covered activities.
- 3) Provide a comprehensive framework through which to foster creative partnerships to achieve conservation benefits from mitigation measures for incidental take by covered

activities that collectively exceed benefits attainable through otherwise piecemeal, spatially and temporally disparate, project-by-project, species-by-species mitigation efforts.

6.1.2 Biological Objectives

Within the HCP planning process, biological objectives define the individual components needed to achieve the biological goals. For the covered activities proposed under the requested individual take permit, the biological objectives generally include comprehensive minimization and mitigation measures established for each covered species, compliance and mitigation monitoring, an adaptive management framework, and assurance of adequate funding. A complex approach is proposed to minimize adverse impacts to covered species and their habitat and, where such impacts occur, to mitigate incidental take through a flexible, needs-based conservation strategy. The biological objectives for this HCP are as follows:

- 1) Minimize adverse impacts to covered species and their habitat through avoidance, minimization and conservation measures, and compliance with other BMPs and species-specific restrictions for covered activities within the Permit Area over the 30-year life of the permit, as detailed in sections 6.2 and 6.4.
- 2) Ensure compliance with the aforementioned avoidance, minimization, and conservation measures, BMPs, and species-specific restrictions through on-the-ground habitat assessment surveys or presence/absence surveys for covered species; inclusion of these measures in restrictions with liabilities for noncompliance in construction contracts; performance of compliance inspections by the Applicant for covered activities; and provision of an environmental monitor or contractor training to educate on federally listed species potentially encountered and to provide an incident response plan should federally listed species be encountered, as detailed in sections 6.2 and 6.4.
- 3) Allocate mitigation funds, requisite to compensate for incidental take of habitat, to Service-approved third-party entities from which expenditures will be appropriated by multi-party committees based on species-specific conservation needs for the federally listed endangered large-fruited sand-verbena, Texas poppy-mallow, Navasota ladies'-tresses, American burying beetle, red-cockaded woodpecker, and threatened Pecos sunflower and Louisiana black bear, as detailed in Section 6.4.
- 4) Acquire mitigation credits from Service-approved conservation banks for incidental take of black-capped vireo and golden-cheeked warbler occupied or potential habitat, not to exceed species- and recovery region-specific take levels defined herein, from the recovery region in which take occurs, if available, or from the most appropriate recovery region. Should mitigation credits be unavailable at the time preceding commencement of covered activities, requisite mitigation funds will be allocated to Service-approved third-

party entities from which expenditures will be appropriated by multi-party committees based on species-specific conservation needs, as detailed in sections 6.4.8.3 and 6.4.9.3.

- 5) Acquire mitigation credits from Service-approved conservation banks for incidental take of Houston toad occupied or potential habitat not to exceed 635 acres (257 hectares). Should mitigation credits be unavailable at the time preceding commencement of covered activities, requisite mitigation funds will be allocated to Service-approved third-party entities from which expenditures will be appropriated by multi-party committees based on species-specific conservation needs, as detailed in Section 6.4.6.3.
- 6) Install bird flight diverters along an extent of existing, high priority transmission line (when this line is temporarily out of service) equal to the length of new facilities constructed under covered actions in the Permit Area within 1 mile (1.6 kilometers) of potentially suitable whooping crane stopover habitat in the 180-mile (290-kilometer)) Service-defined migration corridor, as addressed in Section 6.4.7.
- 7) Implement a monitoring and reporting process with annual delivery to the Service, in which will be evaluated and/or documented all habitat assessment or presence/absence surveys completed; compliance with the incidental take permit; HCP goal attainment; covered activities undertaken; impacts to covered species, mitigation fees assessed and paid, and receipts received there from and identified by activity, project, species impacted, and location; the effectiveness of avoidance, minimization and conservation measures, BMPs, and species-specific restrictions; implementation and effectiveness of the terms of the Permit, including financial obligations; adaptive management-based recommendations for improvement; and any other appropriate information to document the Applicant's compliance with the Permit, as detailed in Section 9.
- 8) Adopt an adaptive management strategy to address uncertainty and incorporate newly acquired information and experience into future management plans, as assessed in the annual review, to streamline and improve the decision-making process for the conservation program and to ensure that management changes in response to new, appropriate data are implemented in a timely fashion, as detailed in Section 8.
- 9) Provide financial assurances of adequate mitigation funding for incidental take through a transparent accounting and disbursement process in which funds are deposited into restricted accounts managed by a Service-approved third party or credits are purchased from a Service-approved conservation bank prior to initiation of covered activities where such activities will result in the incidental take of covered species, as stated in Section 10.

6.2 GENERAL MEASURES TO AVOID AND MINIMIZE IMPACTS

6.2.1 Avoidance and Minimization Measures for All Operation and Maintenance Activities

The following conditions would be followed by the Applicant to ensure avoidance and minimization of impacts to the 11 threatened and endangered species included in this HCP. These conditions would be followed during all operation and maintenance activities:

- To the maximum extent practicable, the Applicant will avoid clearing and ground-disturbing activities during the breeding season of a covered species when covered activities are within or adjacent to potential habitat for that species and such activities would affect breeding success. Species-specific measures and BMPs to avoid such impacts on breeding success are described below in Section 6.4.
- Vegetation will be cleared by aboveground means when practical. Aboveground vegetation clearing methods, such as mowing or manual cutting, would minimize impacts to soil resources compared to belowground clearing methods, such as disking, and consequently, these methods would minimize adverse direct and indirect effects to covered species associated with soil disturbance.
- Onsite qualified environmental personnel employed or contracted by the Applicant will monitor the nonstormwater BMPs to ensure their use, and to document their success/failure for inclusion of this information into an annual compliance report. Stormwater BMPs will be monitored by Applicant personnel. Nonstormwater and stormwater BMPs will be included in contracts. Noncompliance will be identified and corrected.
- Onsite operations will be adaptively managed based on potential impacts to covered species and their habitat as assessed by qualified environmental personnel, and through referencing the best available science, technology, and industry methods through which to avoid or minimize these potential impacts.
- The Applicant will minimize the use of herbicides and pesticides. If herbicides and pesticides are used in covered species habitat, the Applicant's employees or contractors will use only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) and comply with Service guidelines for pesticide application, including but not limited to, "Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S. Fish and Wildlife Service" (Service 2004e).
- The Applicant will follow Texas Forest Service or professional arborists' guidelines for preventing the spread of oak wilt when clearing or trimming trees within those counties where oak wilt is known to occur. These guidelines include, but are not limited to, sterilizing pruning or cutting equipment with bleach between trees, and immediately painting all wounds on oak trees that are larger than 0.5 inch (1.3 centimeters) in diameter.
- Disturbed areas will be returned to approximate preconstruction contours where practical based on baseline survey data, with the intent to minimize impacts to hydrology and avoid adverse indirect impacts on covered species.

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- Disturbed areas will be reseeded with native species when appropriate unless specifically prohibited by the landowner. The project will be monitored to ensure that the reseeded achieves sufficient native vegetation cover and in areas where sufficient cover is not achieved, the reseeded process will be repeated. Site-appropriate species will be selected by qualified Applicant-employed biologists to achieve perennial vegetative cover, either through selection of perennial species or a combination of warm and cool season annuals.
 - For operation and maintenance projects, especially those involving upgrades, that are anticipated to encounter a covered species, the Applicant will either provide a qualified environmental monitor onsite or conduct training for construction personnel to ensure compliance with this HCP. The training program, should it be needed, will provide information on the covered species, including recognition of the species and habitat, general biology, potential threats and impacts, a list of the BMPs included in this HCP, and instructions on what to do if a covered species is encountered in the field during covered activities. The attendees will also be made aware of the importance of onsite vigilance by staff and contractors regarding field conditions and application of the BMPs designed to minimize potential impacts to the covered species. This training course will be provided by qualified Applicant employees or consultants. The Applicant will appoint two employees to serve as points of contact for supplying information to and answering questions from its employees, contractors, and the Service in this regard. Contracts of contractors working within the proposed Permit Area will contain language requiring the use of BMPs identified in this HCP and the consequences and liabilities for noncompliance.
 - Operation and maintenance projects will be assessed on a project-by-project basis by Applicant-employed or contracted qualified environmental personnel for the likely occurrence of covered species habitat, as well as the presence of other regulated resources. When covered projects are proposed in counties identified as within the range of a covered species, qualified biologists will conduct field habitat assessment surveys to ground-truth the existence, location, and quality of potential habitat. If the potential habitat meets the TPWD description of habitat but is determined not to be habitat, the Service will be provided with copies of the assessment survey for review and concurrence/approval. The need for habitat assessment species surveys will be determined by reviewing updated available literature, such as county soil surveys, topographic maps, and aerial photography. The need for presence/absence surveys will be determined by reviewing the information gathered during the onsite habitat assessment surveys. In addition, updated records of known occurrences will be reviewed and, as necessary, consultation with Federal and state biologists and other experts will be continued.
 - Except as described within this paragraph, in the event potential habitat for covered species is identified within or adjacent to a proposed facility, presence/absence surveys will be conducted by qualified federally permitted biologists in accordance with the most recent Service protocols. In the event no Service protocols are available, other widely accepted survey methods will be utilized. If unavoidable potential habitat is identified, the Applicant has the option to assume the potential habitat is occupied and mitigate at a predetermined species-specific take, which could be as high as a 3:1 ratio (i.e., 3 acres of mitigation for each acre of impact), or have a qualified federally permitted biologist conduct habitat assessment or presence/absence surveys according to Service protocols and mitigate at the same or lower ratio. In the event presence of one or more of the 11 federally listed species covered by this permit is identified within or adjacent to the proposed facility, the Applicant will buy mitigation credits from a Service-approved conservation bank or provide mitigation funds as described in Section 6.4.

6.2.2 Avoidance and Minimization Measures for All New Facilities

The following conditions would be followed by the Applicant to ensure avoidance and minimization of impacts to the 11 threatened and endangered covered species included in this HCP. These conditions would be followed for all new facilities:

- To the maximum extent practicable, new facilities will avoid known populations of the covered species. Locations of known populations of the covered species will be determined through consultation with the Service, Federal and state biologists, and other experts, available databases, such as the Texas Natural Diversity Database, and the best available information, as evaluated immediately prior to initiation of covered activities.
- To the maximum extent practicable, new facilities will avoid potential habitat of the covered species, either through routing around or spanning across these areas. Potential habitat for the covered species will be defined by species-specific habitat requirements, as discussed in Section 3, refined according to the best available scientific understanding, and delineated through desktop review (i.e., assessment of topographic maps, soil surveys, aerial imagery, or other remote data pertinent to habitat requirements) and field habitat assessment surveys of proposed rights-of-way by an Applicant-employed or contracted, qualified biologist(s). Avoidance of potential habitat will be more practicable for habitat specialists, such as the covered bird and plant species, and less so for habitat generalists, such as the American burying beetle.
- To the maximum extent practicable, new facilities will avoid all lands that are being managed specifically for a federally listed species. Prior to initiation of activities, the Applicant will research land ownership for new facilities to determine ownership status, whether or not the property is owned by a governmental or similar conservation entity, and if it is recognized by the Service as being specifically managed for a federally listed species. In the event a new utility line cannot be routed to avoid these areas, the Applicant will seek further guidance from the Service on that segment of the line. It is recognized that it may be possible to avoid impacts to federally listed species within these lands. This does not include maintenance/upgrades to the Applicant's facilities within rights-of-way in existence at the time of issuance of the requested permit.
- To the maximum extent practicable, the Applicant will avoid clearing and ground-disturbing activities during the breeding season of a covered species when covered activities are within or adjacent to potential habitat for that species and such activities would affect breeding success. Species-specific measures and BMPs to avoid such impacts on breeding success are described below in Section 6.4.
- To the maximum extent practicable, new facilities will be constructed adjacent to existing, maintained rights-of-way. Construction of new facilities adjacent to existing, maintained rights-of-way will minimize direct and indirect impacts to covered species, especially impacts related to habitat fragmentation and edge effects.
- Vegetation will be cleared by aboveground means when practical. Aboveground vegetation clearing methods, such as mowing or manual cutting, would minimize impacts to soil resources relative to belowground clearing methods, such as disking, and consequently, these approaches would minimize direct and indirect adverse effects to covered species associated with soil disturbance.

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- Onsite qualified environmental personnel employed or contracted by the Applicant will monitor the nonstormwater BMPs to ensure their use, and to document their success/failure for inclusion of this information into an annual compliance report. Stormwater BMPs will be monitored by the Applicant's personnel. Nonstormwater and stormwater BMPs will be included in contracts. Noncompliance will be identified and corrected.
 - Onsite operations will be adaptively managed based on potential impacts to covered species and their habitat as assessed by qualified environmental personnel, and through referencing the best available science, technology, and industry methods through which to avoid or minimize these potential impacts.
 - The Applicant will follow Texas Forest Service or professional arborists' guidelines for preventing the spread of oak wilt when clearing or trimming trees within those counties where oak wilt is known to occur. These guidelines include sterilizing pruning or cutting equipment with bleach between trees, and immediately painting all wounds on oak trees that are larger than 0.5 inch (1.3 centimeters) in diameter.
 - Disturbed areas will be returned to approximate preconstruction contours where practical based on baseline survey data, with the intent to minimize impacts to hydrology and avoid adverse indirect effects on covered species.
 - Disturbed areas will be reseeded with native species when appropriate unless specifically prohibited by the landowner. The project will be monitored to ensure that the reseeded achieves sufficient native vegetation cover and in areas where sufficient cover is not achieved, the reseeded process will be repeated. Site-appropriate species will be selected by qualified Applicant-employed biologists to achieve perennial vegetative cover, either through selection of perennial species or a combination of warm and cool season annuals.
 - For new projects anticipated to encounter a covered species, the Applicant will either provide a qualified environmental monitor onsite or conduct training for construction personnel to ensure compliance with this HCP. If this training takes place, the program will provide information on the covered species, including recognition of the species and habitat, general biology, potential threats and impacts, a list of the BMPs in this HCP, and instructions on what to do if a covered species is encountered in the field during covered activities. The attendees will also be made aware of the importance of onsite vigilance by staff and contractors regarding field conditions and application of the BMPs designed to minimize potential impacts to the covered species. This training course will be provided by qualified Applicant employees, or consultants. The Applicant will appoint two employees to serve as points of contact for supplying information to and answering questions from its employees, contractors, and the Service. Contracts of contractors working within the proposed Permit Area will contain language requiring the use of BMPs identified in this HCP and the consequences and liabilities for noncompliance.
 - New projects will be assessed on a project-by-project basis by Applicant-employed or contracted qualified biologists for the likely occurrence of covered species habitat, as well as the presence of other regulated resources within or adjacent to a proposed facility. When covered projects are proposed in counties identified as within the range of a covered species, qualified biologists will conduct field habitat assessment surveys to ground-truth the existence, location and quality of potential habitat. The need for the habitat assessment surveys will be determined by reviewing updated available literature such as county soil surveys, topographic maps, and aerial

photography. The need for presence/absence surveys will be determined by reviewing the information gathered during the onsite habitat assessment surveys. In addition, updated records of known occurrences will be reviewed and, as necessary, consultation with Federal and state biologists and other experts will be continued.

- Except as described within this paragraph, in the event potential habitat for covered species is identified within or adjacent to a proposed facility, presence/absence surveys will be conducted by qualified federally permitted biologists in accordance with the most recent Service protocols. In the event no Service protocols are available, other widely accepted survey methods will be utilized. If unavoidable potential habitat is identified, the Applicant has the option to assume the potential habitat is occupied and mitigate at a predetermined species-specific take, which could be as high as a 3:1 ratio (i.e., 3 acres of mitigation for each acre of impact), or have a qualified federally permitted biologist conduct habitat assessment or presence/absence surveys according to Service protocols and mitigate at the same or lower ratio. In the event presence of one or more of the 11 federally listed species covered by this permit is identified within or adjacent to the proposed facility, the Applicant will buy mitigation credits from a Service-approved conservation bank or provide mitigation funds as described in Section 6.4.
- Because most of the land in Texas is privately owned and little information about biological resources is available on such lands, specific measures will be taken to identify the presence or absence of sensitive resources as part of the route selection process for new projects. Specific measures may include, but are not limited to, remote sensing techniques, aerial photo interpretation, and review of historic and current topographic, soil survey, National Wetlands Inventory, and other maps and geospatial data. When possible, routes will be selected or adjusted to minimize impacts to suitable and/or occupied habitat.

6.2.3 Stormwater Best Management Practices

Table 6-1 presents examples of stormwater BMPs that will be implemented through a written stormwater pollution prevention plan when one is required to comply with applicable state regulations. These stormwater BMPs, which apply to both new facilities and operation and maintenance of existing facilities, are examples. Variations or state-of-the-art stormwater BMPs equivalents or better may be substituted. For projects anticipated to encounter a covered species, The Applicant will still adhere to appropriate stormwater BMPs even when a written stormwater pollution prevention plan is not required. Erosion and siltation management during construction will meet all local and TCEQ requirements and protocols for storage, use and spill containment, and countermeasures for construction-related chemical and petroleum products. These stormwater BMPs will be monitored onsite by Applicant personnel and included in report documents.

Other BMPs and avoidance, minimization, and conservation measures that are species-specific have also been identified (see Section 6.4, below). These will be implemented even when a written stormwater pollution prevention plan is not required. In addition, some stormwater BMPs will be upgraded to better protect specific covered species if appropriate. Under the conditions of the requested permit, the Applicant and/or its contractors will implement the species-specific conservation measures outlined below in Section 6.4. Unavoidable impacts (take) will be mitigated as described in Section 6.4.

Table 6-1. Stormwater Best Management Practices

ID	Pollutant	Best Management Practice Examples
S1	Sediment	<p>Erosion controls:</p> <ul style="list-style-type: none"> • Temporary stabilization <ul style="list-style-type: none"> • Establish an annual vegetative ground cover • Erosion control blankets (temporary design) • Mulch (straw, hay, wood chips, etc.) • Liquid soil binders • Preservation of mature vegetation when practical • Temporary interceptor dikes and swales • Permanent stabilization <ul style="list-style-type: none"> • Establish a perennial vegetative cover (perennial vegetation or a combination of cool season and warm season annual vegetation) • Erosion control blankets (permanent design) • Turf reinforcing mats • Rip rap • Crushed rock • Permanent interceptor dikes and swales <p>Sediment controls:</p> <ul style="list-style-type: none"> • Silt fence • Hay bales • Wattles (sediment logs) • Filter berms • Storm drain inlet sediment barrier • Offsite sediment tracking control (stabilized access, pressure washers, mechanical cleaning)
S2	Fuels and Chemicals	<p>Spill/leak prevention:</p> <ul style="list-style-type: none"> • All aboveground tanks, drums, cans or other containers used to store liquid materials such as fuel will be placed in secondary containment or similar measures will be used when practical. All hazardous materials related to construction and maintenance will be properly contained, used, and/or disposed of. • Fuel trucks and lubrication equipment will be inspected and maintained regularly. Inspection will include containers, valves, lines, and hoses and will ensure proper working conditions and integrity. Leaks will be repaired promptly and measures taken to prevent soil contamination. • Fuel trucks, mobile tanks, and lubricating vehicles will be parked in designated areas when not in use.
		<ul style="list-style-type: none"> • Equipment fueling, lubrication and servicing activities will take place within the rights-of-way when possible and either outside the boundary of the 100-year floodplain or 500 feet away from waterways and wetlands, whichever is greater. The following exceptions are allowed: <ul style="list-style-type: none"> – Locations where movement of equipment to refueling stations would cause excessive surface disturbance. – When removal of equipment from a wetland would result in additional adverse impacts to the wetland. – Locations where the waterway or wetland is adjacent to a road crossing. – Where flotation equipment is used, refueling will occur at designated docking locations. – Refueling of stationary equipment such as boring rigs. • Personnel will exercise diligence to prevent spills when transferring fuel to vehicles and equipment. Fuel hoses in use will be attended at all times. Care will be taken to avoid overfilling fuel tanks.

ID	Pollutant	Best Management Practice Examples
		Spill/leak response: <ul style="list-style-type: none"> • Develop a spill/leak response plan appropriate to the project scope. • Additional S2 actions include: <ul style="list-style-type: none"> – A pre-project vehicle/equipment inspection and maintenance followed by increased inspection during project implementation to reduce the risk of spills and leaks. Depending on the sensitivity of the protected ecology and its proximity to the covered activity, inspections could be performed as often as once per day. – To further reduce the risk of a spill or leak reaching a waterbody, waterbody setbacks would be increased over normal as well as increased protection of storm drain inlets in municipal settings. Setback distances and inlet protection will be determined on a case-by-case basis taking into consideration the covered activity, the sensitivity of the environment and its proximity to the covered activity.
S3	Concrete	When practical, concrete truck wash out, surplus concrete and drum wash will be managed at the concrete facility. If necessary, wash out, surplus concrete and drum wash may be discharged to the ground surface but would be minimized. The discharge would be at least 100 feet from the nearest jurisdictional area (wetland, creek, river, lake, etc.) or storm sewer facility (roadside ditches, storm drains, etc.) and would be retained in the vicinity.
S4	Dust	Suppress dust, primarily by spraying water on access routes, when necessary.
S5	Litter, Trash and Debris	All litter, trash, and construction debris will be disposed in appropriate containers in accordance with governing local, state, and Federal regulations.
S6	Sanitary Wastes	Existing permanent facilities will be used or portable sanitary facilities will be provided onsite and will be strategically located to minimize the risk of accidental discharge to waters of the U.S. Licensed sanitary waste contractors will collect and dispose of sanitary wastes.

6.3 SUMMARY OF REQUESTED INCIDENTAL TAKE AUTHORIZATION

Incidental take can be expressed in terms of the number of individuals or the amount of habitat taken. Because the precise number of individuals impacted is indeterminable, incidental take for the covered species for this HCP, except for the whooping crane, is expressed in terms of the number of acres of potential habitat directly and/or indirectly impacted by the covered activities. The whooping crane, however, is expressed in terms of the number of individuals.

The Applicant has projected an acreage of potential and/or occupied habitat for the 10 species that may be impacted as a result of the covered activities, and an estimated take of the number of individuals for the whooping crane. These estimates, presented in Table 6-2, reflect the maximum allowable take under the requested permit. The impact acreage estimates involved extensive research to gather data relating to mileage and rights-of-way acreage for existing linear facilities within the Applicant’s proposed Permit Area, along with projections of future maintenance/replacement of these facilities. Locations of existing facilities were compared to Service county listings for each covered species by utilizing the Applicant’s knowledge of known potential habitat locations in relation to existing facilities. Additionally, maximum values include a growth reserve to account for unidentified new construction of linear and nonlinear facilities. It should be noted that the Service county listings are subject to change and the online current version will be consulted for projects.

Table 6-2. Acres (Hectares) of Requested Incidental Take Authorization for Covered Species

Common Name ¹	Scientific Name ¹	Service Status ²	Authorized Incidental Take Requested ³	
PLANTS				
Large-fruited sand-verbena	<i>Abronia macrocarpa</i>	E	5.5	(2.2)
Texas poppy-mallow	<i>Callirhoe scabriuscula</i>	E	64	(26)
Navasota ladies'-tresses	<i>Spiranthes parksii</i>	E	943	(382)
Pecos sunflower	<i>Helianthus paradoxus</i>	T	9	(3.6)
INVERTEBRATES				
American burying beetle	<i>Nicrophorus americanus</i>	E	3,972	(1,608)
AMPHIBIANS				
Houston toad	<i>Bufo houstonensis</i>	E	635	(257)
BIRDS				
Whooping crane ⁴	<i>Grus americana</i>	E		
Golden-cheeked warbler	<i>Dendroica chrysoparia</i>	E	2,997	(1,213)
Black-capped vireo	<i>Vireo atricapilla</i>	E	5,714	(2,313)
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	514	(208)
MAMMALS				
Louisiana black bear	<i>Ursus americanus luteolus</i>	T	194	(79)

¹Nomenclature follows the Service (2010).

²Service – U.S. Fish and Wildlife Service.

E – Endangered; T – Threatened.

³Estimated incidental take in acres (hectares) of suitable and/or occupied habitat during the 30-year life of the requested permit for covered projects.

⁴Potential effects not calculated on acreage basis. Estimated take of 1 individual over 30-year project life.

6.4 SPECIES-SPECIFIC AVOIDANCE AND MINIMIZATION MEASURES AND MITIGATION FOR UNAVOIDABLE IMPACTS

While take of listed plants is not prohibited under section 9 of the ESA, no Federal action, including issuance of a permit, can jeopardize the continuing existence of any listed species, including plants. In order to avoid jeopardy to the large-fruited sand-verbena, Texas poppy-mallow, Navasota-ladies'-tresses, and Pecos sunflower, specific actions will be taken to minimize and avoid impacts. These avoidance and minimization measures are presented in sections 6.2.1, 6.2.2, and 6.2.3. In addition to these measures, the Applicant will undertake certain conservation measures outlined below to further minimize impacts. Unavoidable impacts (take) will be compensated through the mitigation plan presented below.

6.4.1 Large-Fruited Sand-Verbena

6.4.1.1 New Facilities

As noted in Section 6.2.2, the Applicant will, when routing new transmission lines, avoid and route around, where practicable, known populations of the large-fruited sand-verbena. Field habitat assessment surveys of the proposed rights-of-way in areas of potential habitat, such as deep sands of the Padina and Arenosa series, and dune habitat, will be conducted by the Applicant or its consultant to determine potential habitat prior to clearing and construction. If the project schedule allows, presence/absence

surveys will be conducted in areas of potential habitat. If no presence/absence surveys are conducted in potential habitat, the Applicant will assume presence, and measures will be taken to avoid or minimize take, such as spanning potential habitat. Unavoidable take will be mitigated as described below.

If presence/absence surveys are conducted, they will take place between March and June when the plant is flowering (Poole and Riskind 1987, Texas Parks and Wildlife Department 1996a). Field surveys conducted outside of the flowering season will be used to identify potential habitat. Potential habitat identified within the proposed rights-of-way of a new line during the nonflowering period will be spanned, if possible. If spanning is possible, no presence/absence surveys will be conducted. Individual plants/populations encountered within the rights-of-way will be temporarily fenced off with chain-link fencing and avoided, where presence/absence surveys are conducted. This temporary fencing of the large-fruited sand-verbena within the rights-of-way would protect the plants from disturbance by humans during construction or from grazing animals. Clearing will be avoided or minimized in these areas. Where unavoidable potential habitat occurs but presence/absence surveys are not conducted, the Applicant will assume presence, implement minimization measures and BMPs, and mitigate for impacts. Populations adjacent to the rights-of-way will be avoided. In summary, populations of the large-fruited sand-verbena encountered within the rights-of-way of a new line will be avoided or spanned, where possible.

Where covered projects traverse or are adjacent to potential habitat for the large-fruited sand-verbena, the Applicant will, to the maximum extent practical, minimize impacts to populations through measures such as, but not limited to, controlling equipment access, using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence), and minimizing mechanical means of clearing during construction. Also, when feasible and unless specifically prohibited by the landowner, the Applicant will maintain open, native plant composition on blowout sand dune habitats rather than planting fast-growing herbaceous species in the rights-of-way to help preserve potential and occupied large-fruited sand-verbena habitat (Texas Parks and Wildlife Department 1996a).

6.4.1.2 Existing Facilities

Except for emergency responses, if maintenance activities of an existing line are to occur in the vicinity of a known population or in potential habitat of this species, field habitat assessment surveys will be conducted prior to commencement of the activities, as discussed above. Any populations of the large-fruited sand-verbena encountered within the existing rights-of-way will be temporarily fenced off with chain-link fencing and avoided, where presence/absence surveys are conducted. If no presence/absence surveys are conducted in potential habitat, the Applicant will assume presence, implement minimization measures and BMPs, and mitigate for unavoidable impacts, as described below. Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed unless they qualify as danger trees. Herbicide use for maintaining the rights-of way will be minimized, and the Applicant or its contractor will use appropriate

herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence).

6.4.1.3 Mitigation for Unavoidable Impacts

It is anticipated that the avoidance, minimization, and conservation measures described above and in sections 6.2.1, 6.2.2, and 6.2.3 will avoid or minimize adverse impacts to the large-fruited sand-verbena. Some covered activities, however, even with the implementation of these measures, could lead to incidental take.

If identified known occupied habitat or potential habitat will be impacted, the Applicant will provide mitigation funds. To calculate the mitigation costs, the acreage of take within each county and the most recent land prices (cost per acre) within each county, will be determined. The mitigation cost will be a summation of the total acreage impacted (as determined by qualified biologists) multiplied by the most current cost per acre (as determined by Applicant or Applicant-contracted right-of-way agents) in each county. The mitigation ratio will be 1:1 (i.e., 1 acre of mitigation for each acre of impact). An estimated acreage of take for the large-fruited sand-verbena is presented in Table 6-2 and is discussed in more detail in Section 5. This take is for direct impacts from existing facilities. Because of BMPs currently being used, the Applicant believes that indirect impacts from operation and maintenance of existing facilities will be avoided. The Applicant does not anticipate take for new facilities. The rationale for these determinations is discussed above within the respective sections for new and existing facilities.

The Applicant will place the mitigation funds into an account for the large-fruited sand-verbena to be managed by the Lady Bird Johnson Wildflower Center, with Service approval. The Lady Bird Johnson Wildflower Center is a 279-acre native plant preserve located in Austin, Texas, that currently manages conservation programs and funds for the large-fruited sand-verbena. The Lady Bird Johnson Wildflower Center and the Service will decide how best to use the monies for the large-fruited sand-verbena. A Service-approved time limit for spending the mitigation funds will be established. All funds will be provided prior to any clearing or construction activities on each project identified as occurring within known occupied habitat or potential habitat with assumed presence, as further described under Funding (Section 10) of this document.

6.4.2 Texas Poppy-Mallow

6.4.2.1 New Facilities

As noted in Section 6.2.2, the Applicant will, when routing new transmission lines, avoid and route around, where practicable, known populations of the Texas poppy-mallow. Field habitat assessment surveys of the proposed rights-of-way in areas of potential habitat, such as deep sands, especially Tivoli soils, along the current and historic Colorado River drainage (Poole and Riskind 1987, Texas Organization for Endangered Species 1993) will be conducted by the Applicant or its consultant to determine potential habitat prior to clearing and construction. If the project schedule allows,

presence/absence surveys will be conducted in areas of potential habitat. If no presence/absence surveys are conducted in potential habitat, the Applicant will assume presence, and measures will be taken to avoid take, such as spanning potential habitat. Unavoidable take will be mitigated as described below.

If presence/absence surveys are conducted, they will take place between April and June when the characteristics of the mature plant, particularly its flower, can be used to distinguish it from closely related species (Poole and Riskind 1987, Texas Parks and Wildlife Department 1996b). Field surveys conducted outside of this period will be used to identify potential habitat. Potential habitat identified within the proposed rights-of-way of a new line during the nonflowering period will be spanned, if possible. If spanning is possible, no presence/absence surveys will be conducted. Individual plants/populations encountered within the rights-of-way will be temporarily fenced off with chain-link fencing and avoided, where presence/absence surveys are conducted. This temporary fencing of the Texas poppy-mallow within the rights-of-way would protect the plants from disturbance by humans during construction or from grazing animals (Service 1985a, Texas Parks and Wildlife Department 1996b). Clearing will be avoided or minimized in these areas. Where potential habitat occurs but presence/absence surveys are not conducted, the Applicant will assume presence, implement minimization measures and BMPs, and mitigate for unavoidable impacts. Populations adjacent to the rights-of-way will be avoided. In summary, populations of the Texas poppy-mallow encountered within the rights-of-way of a new line will be avoided or spanned, where possible.

Where covered projects traverse or are adjacent to potential habitat for the Texas poppy-mallow, the Applicant will, to the extent practicable, minimize impacts to populations through measures such as, but not limited to, controlling equipment access, using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence), and minimizing mechanical means of clearing, such as mowing, until after the fruit has matured (July). If reseeding the rights-of-way is necessary, a local native plant mixture will be used, unless specifically prohibited by the landowner, to reduce the introduction of exotic species.

6.4.2.2 Existing Facilities

Except for emergency responses, if maintenance activities of an existing line are to occur in the vicinity of a known population or potential habitat of this species, field surveys will be conducted by the Applicant or its consultant prior to commencement of the activities. Any populations of the Texas poppy-mallow encountered within the existing rights-of-way will be temporarily fenced off with chain-link fencing and avoided, where presence/absence surveys are conducted. If no presence/absence surveys are conducted in potential habitat, the Applicant will assume presence, and measures will be taken to avoid or minimize take, such as spanning potential habitat. Unavoidable take will be mitigated as described below. Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed unless they qualify as danger trees. Herbicide use for maintaining the rights-of way will be minimized, and the Applicant or its contractor

will use appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence).

6.4.2.3 Mitigation for Unavoidable Impacts

It is anticipated that the avoidance, minimization, and conservation measures described above and in sections 6.2.1, 6.2.2, and 6.2.3 will avoid or minimize adverse impacts to the Texas poppy-mallow. Some covered activities, however, even with the implementation of these measures, could lead to incidental take.

If known occupied habitat or potential habitat will be impacted, the Applicant will provide mitigation funds. To calculate the mitigation costs, the acreage of take within each county and the most recent land prices (cost per acre) within each county, will be determined. The mitigation cost will be a summation of the total acreage impacted (as determined by qualified biologists) multiplied by the most current cost per acre (as determined by the Applicant or Applicant-contracted right-of-way agents) in each county. The mitigation ratio will be 1:1 (i.e., 1 acre of mitigation for each acre of impact). An estimated acreage of take for the Texas poppy-mallow is presented in Table 6-2 and is discussed in more detail in Section 5. This take is for direct impacts from existing facilities. Because of BMPs currently being used, the Applicant believes that indirect impacts from operation and maintenance of existing facilities will be avoided. The Applicant does not anticipate take for new facilities. The rationale for these determinations is discussed above within the respective sections for new and existing facilities.

The Applicant will place the mitigation funds into an account for the Texas poppy-mallow to be managed by the Lady Bird Johnson Wildflower Center with Service approval. The Lady Bird Johnson Wildflower Center is a 279-acre native plant preserve located in Austin, Texas, that currently manages conservation programs and funds for the Texas poppy-mallow. The Lady Bird Johnson Wildflower Center and the Service will decide how best to use the monies for the species. A Service-approved time limit for spending the mitigation funds will be established. All funds will be provided prior to any clearing or construction activities on each project identified as occurring within known occupied habitat or potential habitat with assumed presence, as further described under Funding (Section 10) of this HCP.

6.4.3 Navasota Ladies'-Tresses

6.4.3.1 New Facilities

As noted in Section 6.2.2, the Applicant will, when routing new transmission lines, avoid and route around, where practicable, known populations of the Navasota-ladies'-tresses. Field surveys of the proposed rights-of-way in areas of potential habitat, such as sandy loam soils and intermittent drainages, will be conducted by the Applicant or its consultant to determine presence/absence of the species prior to clearing and construction. The presence/absence surveys will take place between mid-October and mid-November when the plant is blooming and can be distinguished from its two closest relatives, the nodding

ladies'-tresses and the slender ladies'-tresses (Poole and Riskind 1987, Service 1995a, Wilson n.d.). Field surveys for the Navasota-ladies'-tresses will be conducted in the blooming season during favorable climatic years. When conditions are not favorable and/or project schedules do not allow a presence/absence survey to be conducted, the Applicant will assume presence and compensatory mitigation will be provided, as described below. Field surveys conducted outside of the flowering season will be used to identify potential habitat. Potential habitat identified within the proposed rights-of-way of a new line during the nonflowering period will be spanned, if possible. Individual plants/populations encountered within the rights-of-way will be temporarily fenced off with chain-link fencing and avoided, where presence/absence surveys are conducted. This temporary fencing of the Navasota ladies'-tresses within the rights-of-way would protect the plants from disturbance by humans during the clearing and construction phase, and from grazing animals (Texas Parks and Wildlife Department 1997). Clearing will be avoided or minimized in these areas. Where potential habitat occurs but presence/absence surveys are not conducted, the Applicant will assume presence, implement minimization measures and BMPs, and mitigate for unavoidable impacts. Populations adjacent to the rights-of-way will be avoided. In summary, populations of the Navasota-ladies'-tresses encountered within the rights-of-way of a new line will be avoided, or spanned, where possible.

Where covered projects traverse or are adjacent to potential habitat for the Navasota-ladies'-tresses, the Applicant will, to the extent practicable, minimize impacts to populations through measures such as, but not limited to, controlling equipment access, using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence), and minimizing mechanical means of clearing during construction such as mowing during the months of October and November, thereby reducing damage to flowering stalks. If reseeded of the rights-of-way is necessary, a local native plant mixture will be used, unless specifically prohibited by the landowner, to reduce the introduction of exotic species. Because it is also important to retain the integrity of drainages within Navasota ladies'-tresses habitat, the land will be returned to preconstruction contours following construction (Service 1984a). Overhead electric transmission and distribution lines will span drainages.

6.4.3.2 Existing Facilities

Except for emergency responses, if maintenance activities of an existing line are to occur in the vicinity of a known population of this species, field surveys will be conducted by the Applicant or its consultant prior to commencement of the activities. Any populations of the Navasota ladies'-tresses encountered within the existing rights-of-way will be temporarily fenced off with chain-link fencing and avoided, where presence/absence surveys are conducted. If no presence/absence surveys are conducted in potential habitat, the Applicant will assume presence, and measures will be taken to avoid take. Unavoidable take will be mitigated as described below. Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed unless they qualify as danger trees. Herbicide use will be minimized, and the Applicant or its contractor will use appropriate herbicides and application methods that limit impacts on nontarget species

(e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence).

6.4.3.3 Mitigation for Unavoidable Impacts

It is anticipated that the avoidance, minimization, and conservation measures described above and in sections 6.2.1, 6.2.2, and 6.2.3 will avoid or minimize adverse impacts to the Navasota ladies'-tresses. Some covered activities, however, even with the implementation of these measures, could lead to incidental take.

If known occupied habitat or potential habitat will be impacted, the Applicant will provide mitigation funds. To calculate the mitigation costs, the acreage of take within each county and the most recent land prices (cost per acre) within each county, will be determined. The mitigation cost will be a summation of the total acreage impacted (as determined by qualified biologists) multiplied by the most current cost per acre (as determined by the Applicant or Applicant-contracted right-of-way agents) in each county. The mitigation ratio will be 1:1 (i.e., 1 acre of mitigation for each acre of impact). An estimated acreage of take for the Navasota ladies'-tresses is presented in Table 6-2 and is discussed in more detail in Section 5. This take is for direct impacts from existing facilities and for direct and indirect impacts from new facilities. Because of BMPs currently being used, the Applicant believes that indirect impacts from operation and maintenance of existing facilities will be avoided. The rationale for this determination is discussed above within the respective section for existing facilities.

The Applicant will place the mitigation funds into an account for the Navasota ladies'-tresses to be managed by the Lady Bird Johnson Wildflower Center with Service approval. The Lady Bird Johnson Wildflower Center is a 279-acre native plant preserve located in Austin, Texas, that currently manages conservation programs and funds for the Navasota ladies'-tresses. Management of the Navasota Ladies'-Tresses Conservation Fund, established in 1998 through a letter of agreement between the National Fish and Wildlife Federation and the Service, was transferred to the Lady Bird Johnson Wildflower Center in 2005. The purpose of the fund is to be used exclusively for conservation and recovery of the Navasota ladies'-tresses and the habitats on which it depends. The Lady Bird Johnson Wildflower Center and the Service will decide how best to use the monies to carry out this purpose. A Service-approved time limit for spending the mitigation funds will be established. All funds will be provided prior to any clearing or construction activities on each project identified as occurring within known occupied habitat or potential habitat with assumed presence, as further described under Funding (Section 10) of this document.

6.4.4 Pecos Sunflower

6.4.4.1 New Facilities

As noted in Section 6.2.2, the Applicant will, when routing new transmission lines, avoid and route around, where practicable, known populations of the Pecos sunflower. Field habitat assessment surveys of the proposed rights-of-way in areas of potential habitat, such as springs, seeps, and areas of deep,

hydric loam soils, will be conducted by the Applicant or its consultant to determine potential habitat prior to clearing and construction. If the project schedule allows, presence/absence surveys will be conducted in areas of potential habitat. If no presence/absence surveys are conducted in potential habitat, the Applicant will assume presence, and measures will be taken to avoid take, such as spanning potential habitat. Unavoidable take will be mitigated as described below.

If presence/absence surveys are conducted, they will take place between September and November when the plant is flowering, although surveys in early summer would aid in discerning this species from the common sunflower, which blooms from summer through fall (Poole and Riskind 1987, 64 FR 56582–56590). Field surveys conducted outside of the flowering season will be used to identify potential habitat. Potential habitat identified within the proposed rights-of-way of a new line during the nonflowering period will be spanned, if possible. If spanning is possible, no presence/absence surveys will be conducted. Individual plants/populations encountered within the rights-of-way will be temporarily fenced off with chain-link fencing and avoided, where presence/absence surveys are conducted. This temporary fencing of the Pecos sunflower within the rights-of-way would protect individuals from excessive disturbance by humans or grazing animals (Bush and Van Auken 1997, 64 FR 56582–56590). Clearing will be avoided or minimized in these areas. Where potential habitat occurs but presence/absence surveys are not conducted, the Applicant will assume presence, implement minimization measures and BMPs, and mitigate for unavoidable impacts. Populations adjacent to the rights-of-way will be avoided. In summary, populations of the Pecos sunflower encountered within the rights-of-way of a new line will be avoided, or spanned, where possible.

Where covered projects traverse or are near spring habitat, the Applicant will, to the maximum extent practicable, minimize impacts to populations through such measures as controlling equipment access, using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence), and minimizing mechanical means of clearing during construction, thereby reducing the effects to populations of this sunflower species and other spring inhabitants, both onsite and offsite. If reseeding of the rights-of-way is necessary, a local native plant mixture will be used, unless specifically prohibited by the landowner, to reduce the introduction of exotic species, particularly salt cedar.

Aerial electric lines will span known spring habitats, and the placement of fill in cienegas will be avoided to the extent practicable. To preserve soil salinity in project rights-of-way, local soils will be used as fill when possible, rather than importing soils from offsite. When impacts are unavoidable, the Applicant will disturb soils prior to the plant's primary growth period in August. Natural hydrologic regimes will be preserved by spanning waterbodies when possible and returning the land to preconstruction contours following construction.

6.4.4.2 Existing Facilities

Except for emergency responses, if maintenance activities of an existing line are to occur in the vicinity of a known population of this species or potential habitat, field surveys will be conducted by the Applicant or its consultant prior to commencement of the activities. Any populations of the Pecos sunflower encountered with the existing rights-of-way will be temporarily fenced off with chain-link fencing and avoided, where presence/absence surveys are conducted. If no presence/absence surveys are conducted in potential habitat, the Applicant will assume presence, and measures will be taken to avoid take. Unavoidable take will be mitigated as described below. Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed unless they qualify as danger trees. Herbicide use will be minimized, and the Applicant or its contractor will use appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence).

6.4.4.3 Mitigation for Unavoidable Impacts

It is anticipated that the avoidance, minimization, and conservation measures described above and in sections 6.2.1, 6.2.2, and 6.2.3 will avoid or minimize adverse impacts to the Pecos sunflower. Some covered activities, however, even with the implementation of these measures, could lead to incidental take.

If identified known or potential habitat will be impacted, the Applicant will provide mitigation funds. To calculate the mitigation costs, the acreage of take within each county and the most recent land prices (cost per acre) within each county, will be determined. The mitigation cost will be a summation of the total acreage impacted (as determined by a qualified biologist) multiplied by the most current cost per acre (as determined by the Applicant or Applicant-contracted right-of-way agents) in each county. The mitigation ratio will be 1:1 (i.e., 1 acre of mitigation for each acre of impact). An estimated acreage of take for the Pecos sunflower is presented in Table 6-2 and is discussed in more detail in Section 5. This take is for direct impacts from existing facilities. Because of BMPs currently being used, the Applicant believes that indirect impacts from operation and maintenance of existing facilities will be avoided. The Applicant does not anticipate take for new facilities. The rationale for these determinations is discussed above within the respective sections for new and existing facilities.

The Applicant will place the mitigation funds into an account for the Pecos sunflower to be managed by the Lady Bird Johnson Wildflower Center with Service approval. The Lady Bird Johnson Wildflower Center is a 279-acre native plant preserve located in Austin, Texas, that currently manages conservation programs and funds for the Pecos sunflower. The Lady Bird Johnson Wildflower Center and the Service will decide how best to use the monies for the species. A Service-approved time limit for spending the mitigation funds will be established. All funds will be provided prior to any clearing or construction activities on each project identified as occurring within known occupied habitat or potential habitat with assumed presence, as further described under Funding (Section 10) of this document.

6.4.5 American Burying Beetle

6.4.5.1 New Facilities

As noted in Section 6.2.2, the Applicant will, when routing new transmission lines, avoid and route around, where practicable, known populations of the American burying beetle. Covered projects will be assessed on a project-by-project basis for the likely occurrence of American burying beetle habitat. When covered projects are proposed in counties identified as within the range of this species and within the proposed Permit Area (i.e., Lamar and Red River counties), prior to commencement of the activities, the Applicant or its consultant will conduct field habitat assessment surveys to determine potential habitat. Field habitat assessment surveys of proposed rights-of-way would be performed by a qualified biologist to determine the presence of potential habitat prior to construction. If unavoidable potential habitat is identified, the Applicant has the option to assume the potential habitat is occupied and mitigate at 1:1, or to have a qualified federally permitted biologist conduct a presence/absence survey. If the project schedule allows, presence/absence surveys will be conducted by a qualified federally permitted biologist in areas of potential habitat. The need for presence/absence surveys will be determined by reviewing the information gathered during the onsite habitat assessment and reviewing updated records of known occurrences, topographic maps, and aerial photography. In addition, consultation with Federal and state biologists and other experts will be continued.

If presence/absence surveys are conducted, they will be in accordance with the most recent Service protocols. Currently this will be between late spring and late summer (May 20 through September 20) and will occur at night when the overnight low temperature is above 59 degrees Fahrenheit (15 degrees Celsius). Surveys conducted outside of this timeframe, along with aerial photography, will be used to identify potential habitat.

6.4.5.2 Existing Facilities

Except for emergency responses, if maintenance activities of an existing line are to occur in the vicinity of a known population of this species or within potential habitat, field surveys will be conducted prior to commencement of the activities. In cases where presence/absence surveys are not practical, presence will be assumed, take avoidance measures will be implemented, and take of beetles will be compensated. Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed unless they qualify as danger trees. The Applicant or its contractor will minimize herbicide and pesticide use, to the maximum extent practicable, and use only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) and comply with Service (2004e) guidelines for pesticide application.

6.4.5.3 Mitigation for Unavoidable Impacts

It is anticipated that the avoidance, minimization, and conservation measures described above and in sections 6.2.1, 6.2.2, and 6.2.3 will avoid or minimize adverse impacts to the American burying beetle. Some covered activities, however, even with the implementation of these measures, could lead to incidental take.

If known occupied habitat or potential habitat with assumed presence will be impacted, the Applicant will provide mitigation funds. The acreage of take within Lamar and Red River counties and the most recent land prices (cost per acre) within each county will be determined. The mitigation cost will be a summation of the total acreage impacted (as determined by qualified biologists) multiplied by the most current cost per acre (as determined by the Applicant or Applicant-contracted right-of-way agents) in each county and the appropriate mitigation ratio. The mitigation structure for the American burying beetle under this HCP is presented in Table 6-3, and is based upon the beetle presence and potential impacts of the covered activities. Based on the temporal requirements by the Service-approved presence/absence survey, it is anticipated that the Applicant will typically assume American burying beetle presence in potential habitat, implement minimization measures and BMPs, and mitigate for unavoidable impacts. As such, covered activities under this HCP are likely to provide assurance of conservation benefits for the American burying beetle by mitigating for impacts to unoccupied habitat. An estimated acreage of take for the American burying beetle is presented in Table 6-2 and is discussed in more detail in Section 5. This take is for direct impacts from existing facilities. Because of BMPs currently being used, the Applicant believes that indirect impacts from both existing and new facilities will be avoided. The rationale for these determinations is discussed above within the respective sections for new and existing facilities.

Table 6-3. Mitigation Structure for American Burying Beetle

Impacted Habitat	Mitigation Ratio ¹
Unoccupied habitat (nonhabitat) ²	0
Occupied habitat or potential habitat with assumed presence ³	1:1

¹ Mitigation ratio equals acre(s) of mitigation to acre(s) of impact.

² Determined by presence/absence survey conducted by qualified federally permitted biologist(s).

³ No presence/absence survey conducted for potential habitat with assumed presence.

The Applicant will deposit these mitigation funds into an account held by The Nature Conservancy of Texas. The Service Oklahoma Ecological Services Field Office has a Memorandum of Understanding with the Nature Conservancy establishing and for managing a conservation fund for the American burying beetle. A committee consisting of representatives of the Service, The Nature Conservancy of Texas, and other Service-approved members will be set up to determine how the mitigation funds generated by the requested permit would best be used for the benefit of the American burying beetle. Potential uses include land acquisition (fee simple purchase and conservation easements) or financial support for management or restoration activities by The Nature Conservancy, or other nonprofit

organizations, on existing or acquired lands for American burying beetle habitat improvement. One such example would be contribution of funds for habitat acquisition at the Lennox Woods Preserve—a 275-acre preserve for this species managed by The Nature Conservancy in Red River County in northeast Texas. A Service-approved time limit for spending the mitigation funds will be established. All funds will be provided prior to any clearing or construction activities on each project identified as occurring within known occupied habitat or potential habitat with assumed presence, as further described under Funding (Section 10) of this document.

6.4.6 Houston Toad

6.4.6.1 New Facilities

As noted in Section 6.2.2, the Applicant will, when routing new transmission lines, avoid and route around, where practical, known populations of the Houston toad. Critical habitat and preserves established to recover this species will also be avoided. Covered projects will be assessed on a project-by-project basis for the likely occurrence of Houston toad habitat. When covered projects are proposed in counties identified as within the range of this species within the proposed Permit Area (i.e., Bastrop, Lee, Leon, Milam, and Robertson counties), prior to commencement of the clearing and construction activities, the Applicant or its consultant will conduct field habitat assessment surveys of the proposed rights-of-way in areas of potential habitat, such as friable sandy or loamy sandy soils, especially those associated with the Carrizo, Goliad, Queens City, Sparta, or Willis geologic formations (Service 1995a) to determine potential habitat for the Houston toad. If adequate soils are present and the proposed line is within 2 miles of a known or historic Houston toad breeding site but the vegetation is not suitable for the Houston toad, the Applicant, in its habitat assessment, will consider the possibility that the vegetation could be managed to restore habitat before determining that the area is not potential habitat. The need for the habitat assessment surveys will be determined by reviewing updated records of known occurrences, county soil surveys, topographic maps, and aerial photography. In addition, consultation with Federal and state biologists and other experts will be continued.

If unavoidable potential habitat is identified by habitat assessment surveys, the Applicant will assume the potential habitat is occupied and provide mitigation. Presence/absence surveys for the Houston toad will not be conducted. Such surveys are of limited use for electric utility and other linear projects of a similar nature. During the breeding season, waterbodies attract Houston toads from the surrounding area, drawing individuals from suitable habitat 0.5 to 0.75 mile (0.8 to 1.21 kilometers) away. Post-breeding, the toads disperse and are no longer aggregated near the waterbody. Given the transient nature and short-term concentration of populations, presence/absence surveys at such waterbodies would only indicate that toads are present in the general area but would not specify the location of occupied habitat. Furthermore, 3 years of surveys are usually required to provide sufficient evidence that Houston toads are absent from a given area of habitat. Therefore, where impacts to suitable habitat would occur, the presence of Houston toads will be assumed, and the Applicant will provide mitigation funds for the species in lieu of presence/absence surveys.

Where covered projects (both new and existing facilities) traverse or are adjacent to Houston toad habitat, the Applicant will minimize impacts to populations and/or potential habitat through measures such as, but not limited to:

1. Except in emergency situations, no clearing or ground-disturbing activities will occur within 150 feet (45.7 meters) of wetlands, creeks, drainages, ditches, ponds, stock tanks, or other waterbodies in potential or known habitat during the breeding season (January 1–June 30). Outside of the breeding season, water management zones (or streamside management zones) will be in effect. These zones will consist of a minimum width of 50 feet (15 meters) from all edges of water features such as stream channels (areas at least 3 feet [0.9 meter] wide where a sufficient amount of water has scoured away the vegetation) or other waterbodies such as ponds, wetlands, springs, or seeps. Within these zones, any activities that could result in the pollution of a potential breeding site will be prohibited. Water management zones are not within or adjacent to treed areas. A federally permitted biologist will survey potential breeding sites immediately prior to any clearing/construction activity. If any anuran eggs/tadpoles are encountered, these waterbodies will be avoided. Time for surveying for eggs/tadpoles will be built into the project schedule for every clearing/construction activity within potential habitat. For emergency situations, after completion of emergency response actions, any unavoidable impacts (indirect take) will be disclosed to the Service and mitigated for as appropriate.
2. If it is not practical during construction of new facilities (and operation/maintenance of existing facilities) to drive around creeks, modifications to facilitate creek crossings will be acceptable under the following conditions providing that the crossings take place outside of the breeding season: a) stones may be placed on a creek bed and its banks providing that the natural hydrologic flow remains unimpeded and all state and Federal protection criteria for stormwater and jurisdictional waters of the U.S. (including wetlands) are met; b) steep, nonvegetated, stream banks may be graded if the creek does not have wooded riparian vegetation; and c) use of temporary culverts and fill. All state/Federal protection criteria for stormwater and jurisdictional waters of the U.S. will be met, and bare, graded stream banks will be vegetated with native species following project completion unless specifically prohibited by the landowner.
3. Prior to construction of new facilities or ground-disturbing activities, silt fences and berms, or equivalent measures, will be used to protect potential breeding sites from runoff from construction areas. These silt fences and berms will be inspected, and repaired if necessary, on a daily basis to ensure that no holes, structural damage, or any other issues exist that could prevent these devices from performing their intended function.
4. Each morning before work begins, excavations left open overnight will be inspected for the presence of Houston toads. All toads will be immediately placed, unharmed, in a protected area outside of the activity zone.
5. Mowing equipment will be set at a height of 5 inches (13 centimeters) above the ground to minimize the potential for striking Houston toads. In areas where leaving 5-inch (13-centimeter) stumps of woody vegetation would risk damaging equipment, these areas will be mowed to lower than 5 inches (13 centimeters). These areas, however, will be minimized.

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6. Heavy machinery will be operated within the existing/proposed rights-of-way or approved temporary work areas only and will not operate within the water management zones, thus avoiding potential breeding sites.
 7. The natural topography of the area will be maintained to the maximum extent practicable, impacts to the vegetation community will be minimized to the maximum extent practicable, and soil compaction will be avoided, thereby preserving the friability of the soils.
 8. Unless specifically prohibited by the landowner, the disturbed rights-of-way will be revegetated with native herbaceous species normally present in the community. If possible, the edges of the project will be revegetated with native woody species, thereby facilitating dispersal and providing cover for Houston toads (Campbell 2003).
 9. Care will be taken to prevent the introduction of imported red fire ants to the project site, through measures such as minimizing soil disturbance, using local native soils for backfill, and limiting habitat fragmentation to the minimum amount necessary for operations and maintenance, where practicable. Soils and plants brought in for fill and revegetation activities will be inspected to make sure they are not infested with fire ants before they are used in Houston toad habitat.
 10. Herbicide and pesticide application will be minimized. The Applicant or its contractor will use only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) and comply with Service (2004e) guidelines for pesticide application. Herbicides and pesticides will not be used in the water management zones around potential breeding sites.
 11. If feasible, clearing/construction will be completed outside the breeding season (January 1 through June 30).

6.4.6.2 Existing Facilities

Except for emergency responses, if maintenance activities of an existing line are to occur in the vicinity of a known population of this species, field habitat assessment surveys will be conducted by the Applicant or the Applicant's consultant prior to commencement of the activities, according to the aforementioned protocol for the species. As noted above, because of their limited value, presence/absence surveys for the Houston toad will not be conducted. Where suitable habitat exists, Houston toad presence will be assumed, take avoidance measures will be implemented, and take of potential habitat will be compensated at a 1:1 mitigation ratio (i.e., 1 acre of mitigation for 1 acre of impact). Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed unless they qualify as danger trees. Herbicide and pesticide application will be minimized, where practicable. The Applicant or its contractor will use only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) and comply with Service (2004e) guidelines for pesticide application.

6.4.6.3 Mitigation for Unavoidable Impacts

It is anticipated that the avoidance, minimization, and conservation measures described above and in sections 6.2.1, 6.2.2, and 6.2.3 will avoid or minimize adverse impacts to the Houston toad. Some covered activities, however, even with the implementation of these measures could lead to incidental take.

If known occupied habitat or potential habitat with assumed presence will be impacted, the Applicant will buy mitigation. Purchase of credits from a Service-approved conservation bank will be the preferred mitigation strategy, should such credits be available. The Capitol Area Council, Boy Scouts of America was issued a section 10(a)(1)(b) incidental take permit for the Houston toad on November 5, 2003, for the construction and operation of a “High Adventure” Boy Scout camp at the 4,848-acre (1,962-hectare) Griffith League Ranch in Bastrop County. The HCP for the issuance of this incidental take permit established a conservation bank for the Houston toad in which credits remaining after completion of permitted activities could be sold, with Service approval, to other entities to mitigate impacts to the species elsewhere in its range. Acquisition of conservation credits from the Griffith League Ranch, or other conservation banks yet to be developed for the Houston toad, would provide the most effective mitigation strategy. The current mitigation ratio structure for the Capitol Area Council, Boy Scouts of America HCP is 1:1 for high disturbance activities (i.e., 1 acre of conservation credit purchased for 1 acre of impact); 0.6:1 for moderate disturbance activities; and education and research activities for low disturbance activities, with mitigation provided for all impacts within the Permit Area of their HCP (Boy Scouts of America 2003).

Given the current low population levels, the mitigation structure for impacts to Houston Toad habitat under this HCP will be 2:1 (i.e., 2 acres of conservation credit for 1 acre of impact), with no compensatory ratio adjustments based on the degree of impact for covered activities. Assumed Houston toad presence and consequent mitigation where unavoidable impacts to suitable habitat occur will ensure mitigation for all potential impacts but inherently will also likely overclassify occupied habitat. Whereas the acquisition of conservation credits will protect in perpetuity large contiguous tracts of optimal habitat, impacts from covered activities will likely affect fragmented, lower-quality habitat that supports isolated populations at lower densities. Because of the higher net quality of acquired conservation credit acres and allowance of mitigation for impacts on nonoccupied suitable habitat, the Applicant believes that mitigation acre ratios for direct impacts of 1:1 would provide net benefits to the recovery and status of the Houston toad. Avoidance, minimization, and conservation measures and other BMPs proposed under this HCP will likely reduce impacts to the Houston toad.

Should mitigation credits be unavailable from a Service-approved conservation bank at the time preceding the covered activities for which they are required, the Applicant will provide mitigation funds. The acreage of take and the most recent land prices (cost per acre) within each county in which the activities will occur will be determined. The mitigation cost will be a summation of the total acreage impacted (as determined by qualified biologists) multiplied by the most current cost per acre (as determined by the Applicant or Applicant-contracted right-of-way agents) in each county and the

proposed per acre land valuation-based mitigation ratio of 1:1 for potential habitat with assumed presence. Mitigation funds will be deposited into a third-party held account approved of by the Applicant and the Service. A committee consisting of, but not limited to, representatives from the Service, Texas Parks and Wildlife, affected counties, and members of the Houston toad recovery team would determine how best to disburse funds generated by the requested permit to benefit the conservation and recovery of the Houston Toad. Appropriations may include conservation options such as purchase of conservation easements, purchase of conservation credits from a conservation bank, or funding for Houston toad habitat restoration, and, to offset temporary take, research or monitoring. A Service-approved time limit for spending the mitigation funds will be established. All funds will be provided prior to any clearing or construction activities on each project identified as occurring within known occupied habitat or potential habitat with assumed presence.

An estimated acreage of take for the Houston toad is presented in Table 6-2 and is discussed in more detail in Section 5. This take is for direct impacts from both existing and new facilities and for indirect impacts from new facilities. Because of BMPs currently being used, the Applicant believes that indirect impacts from operation and maintenance of existing facilities will be avoided. The rationale for this determination is discussed above within the respective sections for existing facilities.

6.4.7 Whooping Crane

6.4.7.1 New Facilities

As noted in Section 6.2.2, the Applicant will, when routing new transmission lines, avoid and route around, where practical, known stopover areas and potentially suitable stopover habitat of the whooping crane. Covered projects will be assessed on a project-by-project basis for the likely occurrence of potentially suitable stopover habitat for the whooping crane. The Service (2009a) defines suitable whooping crane habitat as shallow wetlands in open (greater than approximately 65.6 feet [20 meters] overwater horizontal visibility to objects over 3.28 feet [1 meter] in height), nonwooded areas free from human disturbance, such as nearby roads or buildings, with at least some water area less than 18 inches (45.7 centimeters) deep. Such habitat includes marshes, lake edges, or rivers. When covered projects in the proposed Permit Area are proposed within the 180-mile (290-kilometer) whooping crane migration corridor, defined by the Service to include 95 percent of confirmed sightings, prior to commencement of the clearing and construction activities, the Applicant or its consultant will conduct field habitat assessment surveys to determine presence of potentially suitable habitat for the whooping crane. Any new transmission lines constructed within 1 mile (1.6 kilometers) of known or potentially suitable whooping crane stopover habitat will be clearly marked with bird flight diverters or other approved devices in accordance with the Avian Power Line Interaction Committee's "Mitigating Bird Collisions with Power Lines: The State of the Art in 1994" (APLIC 1994) or, to the greatest extent practicable, the latest industry standards for preventing avian powerline interactions. For all new transmission lines the flight diverters will be placed on the static wire. Marking these new lines is considered a minimization strategy.

6.4.7.2 Existing Facilities

To provide mitigation for potential incidental whooping crane impacts, the Applicant will install bird flight diverters or other approved devices to clearly mark an extent of existing, high priority transmission or distribution lines (when these lines are temporarily out of service) equal to the length of new transmission line constructed within 1 mile (1.6 kilometers) of known or potentially suitable stopover habitat. Only those sections of the existing lines within 1 mile (1.6 kilometers) of stopover habitat will be marked. Installation would occur when lines are taken out of service for repair, maintenance, or upgrade, and methods used will be in accordance with the Avian Power Line Interaction Committee's "Mitigating Bird Collisions with Power Lines: The State of the Art in 1994" (APLIC 1994) or, to the greatest extent practicable, the latest industry standards for preventing avian powerline interactions. Prioritization of existing transmission lines to determine facilities with the highest probability for whooping crane collision was model-derived based on location within the whooping crane migration corridor and the remote assessment of potential stopover habitat within a 1-mile (1.6-kilometer) radius, as discussed in the Appendix.

Location of bird flight diverter installation is further constrained by logistical difficulties. Because the lines are energized, clearance would be required from the Electric Reliability Council of Texas (ERCOT) to perform this work. Clearance can only be obtained at certain times of the year when the load is such that the line can be taken out of service. If the line is a double-circuit line, it is very difficult to be able to get both lines out at the same time. The line will have to be grounded to ensure the safety of the personnel installing the flight diverters and this adds extra time and expense. However, additional clearance would not be required if flight diverter installation is performed in conjunction with routine repair, maintenance, and upgrade activities. The Applicant would, therefore, prefer to coordinate bird flight diverter installation with routine maintenance, repair, and upgrade activities. Regardless, rights-of-way access will be necessary to reach the span(s) where flight diverters are installed and may be dependent on weather conditions, soil conditions, and structure locations. Further, a number of culverts and access controls would need to be installed to access existing spans. Therefore, the timing and location of bird flight diverter installation for existing powerline facilities will be dependent on the probability for whooping crane collision; the need for regular repair, maintenance, and upgrade activities; and additional constraints discussed above.

6.4.7.3 Mitigation for Unavoidable Impacts

It is anticipated that the avoidance, minimization, and conservation measures described above and in sections 6.2.1, 6.2.2, and 6.2.3, and the marking of new transmission lines constructed within 1 mile (1.6 kilometers) of known or potentially suitable stopover habitat with bird flight diverters or other approved devices will avoid or minimize adverse impacts to the whooping crane. Mitigation will include the installation of bird flight diverters or other approved devices for a length of existing transmission or distribution line equal to that of new transmission line constructed within 1 mile (1.6 kilometers) of known or potentially suitable stopover habitat.

Deterrent techniques of marking power lines have been shown to reduce the risk of line strike by 50 to 80 percent (Brown and Drewien 1995, Morkill and Anderson 1991, Yee 2008). Thus, marking those sections of new transmission line within 1 mile (1.6 kilometers) of known or potential stopover habitat within the whooping crane migration corridor (minimization) and an equal amount of existing transmission line or distribution line within 1 mile (1.6 kilometers) of known or potential stopover habitat within the migration corridor (mitigation) should reduce the number of power line collisions and thus save lives. Nevertheless, despite the avoidance, minimization, and mitigation measures to reduce the potential for collision mortality by avoiding routing near potential stopover habitat when practical, clearly marking new transmission lines with bird flight diverters when this is not practical, and marking an equivalent length of high priority existing lines, migrating whooping cranes could still become victims of collisions with powerlines.

Marking of an equal extent of existing line with bird flight diverters cannot be conducted according to a set schedule or timeframe due to restrictions in taking lines out of service. ERCOT has complete control over the service status of electric transmission lines in the state. As such, Oncor must gain approval from ERCOT before taking lines out of service. Thus, marking lines will be scheduled in concert with other line work that requires the line be taken out of service and the attainment of ERCOT approval to do so.

Based on discussions with Service representatives (Omar Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2010), the Applicant estimates that, despite no recorded occurrence of injury or mortality attributable to existing facilities, over the 30-year life of the permit a high potential remains that one whooping crane may be killed as a result of collision with its electrical facilities and is therefore requesting an incidental take permit for this one bird. Because whooping cranes occur in the proposed Permit Area only during migration, and because of the avoidance, where possible, of known or potentially suitable stopover areas during the routing of new transmission facilities, the high availability of potentially suitable stopover habitat in the landscape, and the standard BMPs typically used by the Applicant, no indirect impacts are anticipated for the whooping crane.

6.4.8 Golden-Cheeked Warbler

6.4.8.1 New Facilities

As noted in Section 6.2.2, the Applicant will, when routing new transmission lines, avoid and route around, where practical, known populations and suitable habitat of the golden-cheeked warbler. Established preserves and parks containing this species, such as the Balcones Canyonlands National Wildlife Refuge, Fort Hood, The Nature Conservancy of Texas preserves, and Meridian State Park, among numerous others within the proposed Permit Area, will also be avoided where possible. Since linear facilities can form barriers between feeding, breeding, and sheltering sites (Campbell 2003), clearing oak-juniper woodland vegetation for the construction of new facilities will be avoided where practicable. If avoidance is not possible, the Applicant will limit clearing activities to the minimum necessary to operate and maintain lines constructed outside of the breeding season, which is from March

1 through August 31. Clearing of access roads outside of the rights-of-way will also be limited unless it is absolutely necessary to clear a larger area. Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed, unless they qualify as danger trees.

Where construction activities occur within 300 feet (91 meters) of golden-cheeked warbler habitat, such activities will be conducted outside of the breeding season (September 1 through February 29) to avoid possible disruption of breeding activities.

Covered projects will be assessed on a project-by-project basis for the likely occurrence of golden-cheeked warbler habitat. When covered projects are proposed in counties identified as within the range of this species within the proposed Permit Area, prior to commencement of the clearing and construction activities, the Applicant or its consultant will conduct field habitat assessment surveys in areas of potential habitat, such as mixed hardwood-juniper woodlands, especially along steep canyons and hillsides, to determine potential habitat. Potential golden-cheeked warbler habitat will be defined according to Service-established criteria, which includes plant community composition, structure, and landscape position, more specifically, proximity to occupied or potential habitat, and acknowledge the influence of patch size and land use on suitability. As such, potential habitat would include vegetation associations not typically associated with golden-cheeked warblers when such habitat is adjacent to vegetation associations that may be or are typically used by golden-cheeked warblers. Service-required forms to document the habitat assessment and determination will be filled out and submitted to the Service within five business days of survey completion, in compliance with the Service's section 10(a)(1)(A) requirements. If unavoidable potential habitat is identified by habitat assessment surveys, the Applicant has the option to assume golden-cheeked warbler presence or to have a qualified federally permitted biologist perform a presence/absence survey. The need for habitat assessment surveys will be determined by reviewing updated records of known occurrences, topographic maps, and aerial photography. In addition, consultation with Federal and state biologists and other experts will be continued.

If the project schedule allows, presence/absence surveys for the golden-cheeked warbler will be conducted by a qualified federally permitted biologist in areas of potential habitat prior to clearing or construction activities. The need for presence/absence surveys will be based on the results of the habitat assessment surveys. If presence/absence surveys are conducted, they will be in accordance with the most recent Service protocols. Currently, surveys must be conducted between March 15 and June 1, with 60 percent of the surveys completed prior to May 15 to capture the peak of the breeding season. An entire patch of contiguous golden-cheeked warbler habitat will be deemed occupied where presence is observed at any location within the patch.

Where suitable habitat cannot be avoided and clearing greater than 16 feet (5 meters) in width is necessary, impacts will be mitigated. In addition to activities within the rights-of-way, this includes all access road areas, staging and equipment storage areas, or other areas related to the covered activities that

would impact the golden-cheeked warbler. A comprehensive mitigation program for impacts to golden-cheeked warbler habitat is discussed below.

6.4.8.2 Existing Facilities

Except for emergency responses, if maintenance activities of an existing line are to occur in the vicinity of a known population of this species or within potential habitat, field habitat assessment surveys will be conducted prior to commencement, according to the aforementioned protocol for the species. If the project schedule allows, presence/absence surveys will be performed. In cases where presence/absence surveys are not practical, presence will be assumed, take avoidance measures will be implemented, and take of potential habitat will be mitigated. A comprehensive mitigation program for impacts to golden-cheeked warbler habitat is discussed below. Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed unless they qualify as danger trees. Herbicide and pesticide application will be minimized. The Applicant or its contractor will use only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) and comply with Service (2004e) guidelines for pesticide application.

6.4.8.3 Mitigation for Unavoidable Impacts

It is anticipated that the avoidance, minimization, and conservation measures described above and in sections 6.2.1, 6.2.2, and 6.2.3 will avoid or minimize adverse impacts to the golden-cheeked warbler. Some covered activities, however, even with the implementation of these measures could lead to incidental take.

If known occupied habitat or potential habitat with assumed presence will be impacted, the Applicant will buy mitigation. Purchase of mitigation credits from a Service-approved conservation bank within the recovery region in which impacts occur will be the preferred mitigation strategy, should such credits be available. However, when unavailable, alternative mitigation strategies, with Service approval, may include purchase of mitigation credits from conservation banks in other recovery regions or mitigation fund contributions to Service-approved third parties for land acquisition (either by fee simple purchase or conservation easements) and management, habitat management on existing lands held for golden-cheeked warbler conservation, or, to offset temporary take, research or monitoring of the golden-cheeked warbler.

Flexibility built into the mitigation program will allow the Applicant to determine incidental take and commensurate mitigation ratios throughout the year, rather than only during the breeding season (March 1–August 31), through two mechanisms: field-based habitat assessments or additionally, presence/absence surveys by a federally permitted qualified biologist should the project schedule allow. Where field-based habitat assessments are used to determine potential golden-cheeked warbler habitat in lieu of presence/absence surveys, presence will be assumed and the habitat patch considered occupied. An estimated acreage of take for the golden-cheeked warbler is presented in Table 6-2 and is discussed in

more detail in Section 5. This take is for direct impacts from both existing and new facilities and for indirect impacts from new facilities. Indirect impacts affect suitable habitat that is within 300 feet (91 meters) of covered activities and will be mitigated at one-half the mitigation ratio of direct impacts.

The mitigation structure proposed under the conservation program for golden-cheeked warbler is based on sound biological rationale and incorporates variability according to the method of assessment, allowing mitigation ratios up to 3:1 (i.e., 3 acres of mitigation for 1 acre of impact) for highly valuable habitat. The proposed mitigation structure for direct impacts is presented in Table 6-4, and indirect impacts, respectively, would be mitigated at one-half the appropriate mitigation ratio. A habitat patch will consist of suitable contiguous habitat as based on scientific reasoning and the best understanding of patch dynamics in relation to the species' requirements. Presence of one golden-cheeked warbler within a patch would deem the entire contiguous patch occupied.

Accordingly, the mitigation ratios proposed for impacts to golden-cheeked warbler habitat are based on habitat quality. Specifically, habitat quality for each occupied patch, as determined by presence/absence surveys conducted by a federally permitted biologist, or with assumed occupancy, would be defined as high, medium, or low quality habitat. Determination of habitat quality will be conducted by a qualified biologist and documented within report documents submitted to the Service for concurrence. Definition of habitat quality for the golden-cheeked warbler as defined by Campbell (2003) is included below.

Prime Habitat: Woodlands with a mixture of mature Ashe juniper and deciduous hardwoods with a total canopy of 35 percent or greater and an overall canopy height of at least 20 feet (6.1 meters) or greater. Mature Ashe juniper is defined as trees of at least 15 feet (4.6 meters) tall with a diameter at breast height (4.5 feet [1.37 meters]) of at least 5 inches (12 centimeters). Associated deciduous hardwoods may include Spanish oak, lacey oak, live oak, shin oak, post oak, blackjack oak, black cherry, Texas ash, redbud, cedar elm, bigtooth maple, hackberry, and pecan. The amount of juniper within these woodlands can vary from 5 to 90 percent. These woodlands often occur in steeper canyons, but can also occur in bottomlands and rolling uplands.

Marginal Habitat: Woodlands with a mixture of mature Ashe juniper and deciduous hardwoods with a total canopy of 35 percent or greater and an overall canopy height of at least 20 feet (6.1 meters). Same criteria as above to define mature Ashe juniper. Medium quality habitat will often be found on drier sites than high quality habitat, and the deciduous species will usually be less diverse. Medium quality habitat may consist of any of the following combinations of dominant tree species as long as percent canopy cover and canopy height criteria are present:

- Mature juniper and live oak
- Mature juniper and post oak and/or blackjack oak
- Mature juniper and shin oak

- Mature juniper and any other mixture of deciduous hardwood

Nonhabitat would include all other vegetation types not meeting criteria defined above for golden-cheeked warbler habitat. However, where otherwise nonsuitable habitat is adjacent (within 300 feet [91 meters]) of suitable habitat, such areas will be deemed suitable habitat and mitigated for according to the habitat quality of the adjacent patch.

Table 6-4. Mitigation Structure for Golden-Cheeked Warbler

Impacted Habitat	Mitigation Ratio ¹
Unoccupied habitat (nonhabitat) ²	0
Low quality habitat	1:1
Medium quality habitat	2:1
High quality habitat	3:1

¹ Mitigation ratio is acre(s) of mitigation to acres of impact.

² Patch occupancy determined by presence/absence surveys or assumed presence.

It is anticipated by the Applicant that, due to project-scheduling constraints, presence/absence surveys will not be conducted and occupancy will be assumed for most covered activities that would impact potential habitat. Furthermore, the proposed mitigation approach is anticipated to benefit and promote the recovery of the golden-cheeked warbler given that habitat protected in perpetuity by conservation credit acquisition will contribute to large, contiguous patches of optimal golden-cheeked warbler habitat. Therefore, mitigation for direct impacts to lower quality habitat at 1:1 would still support and promote the recovery of the golden-cheeked warbler. An increase in the mitigation ratio commensurate with habitat quality increases will ensure that conservation benefits are preserved despite convergence of impacted and conservation credit area habitat quality. The proposed conservation program will allow the Applicant to forego delays in completing covered activities, and hence ensure reliable delivery of electric services to existing and new customers, while promoting the conservation and recovery of the golden-cheeked warbler.

Based on communication with the Service, purchase of mitigation credits from a Service-approved conservation bank for golden-cheeked warbler within the recovery region in which impacts occur is the preferred mitigation strategy (Clayton Napier, the Service, pers. comm. to D. Green, PBS&J, March 2010). Although several conservation banks for the golden-cheeked warbler have been proposed or are under review for approval (Clayton Napier, the Service, pers. comm. to G. Newgord, PBS&J, August 2010), at present only one is active: Hickory Pass Ranch Conservation Bank. This conservation bank is located within the Balcones Canyonlands acquisition area, includes Williamson, Burnet, Blanco, northern Hays, and Travis counties (the approximate boundaries of Recovery Region 5), and currently possesses approximately 1,000 available acres from which mitigation credits can be acquired.

Should mitigation credits be unavailable from a Service-approved conservation bank at the time preceding the covered activities for which they are required, the Applicant will provide mitigation funds.

To calculate the mitigation costs, the acreage of take within each county and the most recent land prices (cost per acre) within each county will be determined. The mitigation cost per project will be a summation of the total acreage impacted (as determined by a qualified biologist) multiplied by the most current cost per acre (as determined by the Applicant or Applicant-contracted right-of-way agents) in each county and the appropriate mitigation ratio, as discussed above. Mitigation funds will be provided to and held by The Nature Conservancy of Texas. A committee consisting of representatives of the Service, The Nature Conservancy of Texas, Texas Parks and Wildlife Department, and other Service-approved members will be set up to determine how best to use these funds for the golden-cheeked warbler. Disbursement of mitigation funds will be appropriated to conservation efforts within the recovery region in which impacts occur and will be commensurate to assessed mitigation costs, except where the committee determines that aggregate funds would provide the greatest conservation benefit for the species.

If sufficient funds are generated to buy a preserve, it would be managed by a third party. Preserve blocks will typically contain a minimum of 500 acres (202 hectares). It may be possible to acquire a preserve that contains habitat for the golden-cheeked warbler and black-capped vireo. If such is the case, sufficient funds may become available for such a purchase more rapidly, since mitigation funds for these two species could be combined. A Service-approved time limit for spending the mitigation funds will be established. All funds will be provided prior to any clearing or construction activities on each project identified as occurring within known occupied habitat or potential habitat with assumed presence. Any habitat that is acquired as result of these funds will be managed and protected for the golden-cheeked warbler in perpetuity.

6.4.9 Black-Capped Vireo

6.4.9.1 New Facilities

As noted in Section 6.2.2, the Applicant will, when routing new transmission lines, avoid and route around, where practical, known populations and suitable habitat of the black-capped vireo. Because the greatest threats to the black-capped vireo are habitat alteration and fragmentation, extensive clearing of native vegetation, especially dense, low-growing shrubs, will be avoided where possible. Established preserves and parks containing this species, such as the Balcones Canyonlands National Wildlife Refuge, Fort Hood, The Nature Conservancy of Texas preserves, and Meridian State Park, among numerous others within the proposed Permit Area, will also be avoided where possible. Covered projects will be assessed on a project-by-project basis for the likely occurrence of black-capped vireo habitat. When covered projects in the Permit Area are proposed in counties identified as within the range of this species, the Applicant or its consultant will conduct field habitat assessment surveys to determine potential habitat prior to commencement of the clearing and construction activities. Service-required forms to document the habitat assessment and determination will be filled out and submitted to the Service within five business days of survey completion, in compliance with the Service's section 10(a)(1)(A) requirements. If unavoidable potential habitat is identified by habitat assessment surveys, the Applicant will have the

option to assume black-capped vireo presence or to have a qualified federally permitted biologist perform a presence/absence survey. The need for habitat assessment surveys will be determined by reviewing updated records of known occurrences, topographic maps, and aerial photography. In addition, consultation with Federal and state biologists and other experts will be continued.

If the project schedule allows, presence/absence surveys for the black-capped vireo will be conducted in areas of potential habitat prior to clearing or construction activities. The need for presence/absence surveys will be based on the results of the habitat assessment surveys. If presence/absence surveys are conducted, they will be performed by a federally permitted biologist in accordance with the most recent Service protocols. Currently, these surveys are conducted between April 10 and July 1, which is the peak of the breeding season. Habitat assessments conducted outside of the April 10–July 1 time frame will be used to identify potential habitat.

If avoidance is not possible, the Applicant will, to the extent practical, choose routes that avoid bisecting blocks of suitable habitat and limit clearing activities to the minimum necessary to operate and maintain lines constructed outside of the breeding season, which is from March 15 through August 31. Clearing of access roads outside of the rights-of-way will also be limited unless it is absolutely necessary to clear a larger area. Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed, unless they qualify as danger trees. Where construction activities occur within 300 feet (91 meters) of black-capped vireo habitat, those activities will be conducted outside of the breeding season (September 1 through March 14) to avoid possible disruption of breeding activities. Where suitable habitat cannot be avoided, impacts will be mitigated. This includes access road areas, staging and equipment storage areas, or other areas that would require clearing or are within 300 feet (91 meters) of potentially suitable habitat. Herbicide and pesticide application will be minimized, where practicable. However, where impracticable, the Applicant or its contractor will use only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) and comply with Service (2004e) guidelines for pesticide application.

6.4.9.2 Existing Facilities

Except for emergency responses, if maintenance activities of an existing line are to occur in the vicinity of a known population of this species or within potential habitat, field habitat assessment surveys will be conducted prior to commencement of the activities, according to the aforementioned protocol for the species. If the project schedule allows, presence/absence surveys will be performed by a qualified federally permitted biologist, and impacts will be mitigated accordingly. In cases where presence/absence surveys are not practical, presence will be assumed, take avoidance measures will be implemented, and take of potential habitat will be compensated, as discussed below. Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed unless they qualify as danger trees. Herbicide and pesticide application

will be minimized, where practicable. The Applicant or its contractor will use only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) and comply with Service (2004e) guidelines for pesticide application.

6.4.9.3 Mitigation for Unavoidable Impacts

It is anticipated that the avoidance, minimization, and conservation measures described above and in sections 6.2.1, 6.2.2, and 6.2.3 will avoid or minimize adverse impacts to the black-capped vireo. Some covered activities, however, even with the implementation of these measures, could lead to incidental take.

If known occupied habitat or potential habitat with assumed presence will be impacted, the Applicant will provide mitigation. Purchase of mitigation credits from a Service-approved conservation bank within the recovery region in which impacts occur will be the preferred mitigation strategy, should such credits be available. When unavailable, alternative mitigation strategies, with Service approval, may include purchase of mitigation credits from conservation banks in adjacent or other recovery regions and/or mitigation fund contributions to Service-approved third parties for land acquisition (either by fee simple purchase or conservation easements) and management, habitat management, and/or to support conservation related research for the black-capped vireo. An example of contributions for habitat management would include financial support for management or restoration activities in support of the species' recovery by The Nature Conservancy, or other nonprofit organization(s), on existing lands held for black-capped vireo conservation. Funds may be allocated for black-capped vireo habitat acquisition and management by such entities. Further, mitigation funds may be disbursed to support large-scale, regional conservation efforts, such as the Service's East Texas Ecosystem Plan. Any habitat that is acquired as result of these funds will be managed and protected for the black-capped vireo in perpetuity.

Flexibility built into the mitigation program will allow the Applicant to determine incidental take and commensurate mitigation ratios throughout the year, rather than only during the peak of the breeding season (April 10–July 1), through two mechanisms: field-based habitat assessments or additionally, presence/absence surveys by a federally permitted qualified biologist should the project schedule allow. Where field-based habitat assessments are used to determine potential black-capped vireo habitat in lieu of presence/absence surveys, presence will be assumed and the habitat patch considered occupied. An estimated acreage of take for the black-capped vireo is presented in Table 6-2 and is discussed in more detail in Section 5. This take is for direct impacts from both existing and new facilities and for indirect impacts from new facilities. Indirect impacts affect suitable habitat that is within 300 feet (91 meters) of covered activities and will be mitigated at one-half the mitigation ratio of direct impacts.

The mitigation structure proposed under the conservation program for black-capped vireo is based on sound biological rationale (e.g., species status, distribution, and abundance; habitat availability; and best available scientific information) and incorporates variability according to the method of assessment,

allowing mitigation ratios up to 3:1 (i.e., 3 acres of mitigation for 1 acre of impact) for highly valuable habitat: The proposed mitigation structure for direct impacts are presented in Table 6-5, and indirect impacts, respectively, would be mitigated at one-half the appropriate mitigation ratio. A habitat patch will consist of suitable contiguous habitat as based on scientific reasoning and the best understanding of patch dynamics in relation to the species' requirements. Presence of one black-capped vireo within a patch would deem the entire contiguous patch occupied.

Accordingly, the mitigation ratios proposed for impacts to black-capped vireo habitat are based on habitat quality. Specifically, habitat quality for each occupied patch, as determined by presence/absence surveys conducted by a federally permitted biologist, or with assumed occupancy, would be defined as high, medium, or low quality habitat. Determination of habitat quality will be conducted by a qualified biologist and documented within report documents submitted to the Service for concurrence. Definition of suitable habitat for the black-capped vireo as defined by Campbell (2003) includes the following species assemblages, community structure and characteristics:

Patchy, low, shrub vegetation with a canopy of 30 to 60 percent extending from the ground up to a height of 6 feet (1.8 meters). Shrub communities that typically provide this structure may include the following species: white shin oak, Mohr's oak, Vasey oak, live oak, Spanish oak, Lacey oak, mountain laurel, Texas persimmon, evergreen sumac, skunkbush sumac, flameleaf sumac, littleleaf sumac, redbud, algerita, elbowbush, Mexican buckeye, greenbriar, guajillo, and fragrant ash. The shrub layer may or may not be combined with a taller tree layer. Smaller irregular patches of open grassland often separate the areas between motts of shrubs and trees. Juniper may or may not be present within habitat, but preferred habitat usually has a low density of juniper. This habitat may exist on many different soils.

Nonhabitat would include all other vegetation types not meeting criteria defined above for black-capped vireo habitat, and includes shrublands dominated by juniper that lack a 30 percent canopy of deciduous shrubs (Campbell 2003). Determination of habitat quality would depend not only on presence of factors discussed above but also include incorporate patch size, where occupied, or presumed occupied, patches greater than 50 acres (20 hectares) in size would be deemed high quality and impacts thereto mitigated at the maximum ratio.

Table 6-5. Mitigation Ratio Structure for Black-Capped Vireo

Impacted Habitat	Mitigation Ratio ¹
Unoccupied habitat (nonhabitat) ²	0
Low quality habitat	1:1
Medium quality habitat	2:1
High quality habitat	3:1

¹ Mitigation ratio is acre(s) of mitigation to acres of impact.

² Patch occupancy determined by presence/absence surveys or assumed presence.

It is anticipated by the Applicant that, due to project-scheduling constraints, presence/absence surveys will not be conducted and occupancy will be assumed for most covered activities that would impact potential habitat. Furthermore, the proposed mitigation approach is anticipated to benefit and promote the recovery of the black-capped vireo given that habitat protected and managed in perpetuity by conservation credit acquisition will contribute to large, contiguous patches of optimal black-capped vireo habitat. Therefore, mitigation for direct impacts to lower quality habitat at 1:1 would still support and promote the recovery of the black-capped vireo. An increase in the mitigation ratio commensurate with habitat quality increases will ensure that conservation benefits are preserved despite convergence of impacted and conservation credit area habitat quality. The proposed conservation program will allow the Applicant to forego delays in completing covered activities, and hence ensure reliable delivery of electric services to existing and new customers, while promoting the conservation and recovery of the black-capped vireo.

Based on communication with the Service, purchase of mitigation credits from a Service-approved conservation bank for black-capped vireo within the recovery region in which impacts occur is the preferred mitigation strategy (Clayton Napier, pers. comm. to Derek Green, PBS&J, 2010). Although several conservation banks, including Clearwater, are in development for the black-capped vireo (Jeff Francell, The Nature Conservancy, pers. comm. to B. Breckenridge, PBS&J, May 2010), at present there are no active black-capped vireo conservation banks within the proposed Permit Area.

Should mitigation credits be unavailable from a Service-approved conservation bank at the time preceding the covered activities for which they are required, the Applicant will provide mitigation funds. To calculate the mitigation costs, the acreage of take within each county and the most recent land prices (cost per acre) within each county will be determined. The mitigation cost per project will be a summation of the total acreage impacted (as determined by a qualified biologist) multiplied by the most current cost per acre (as determined by the Applicant or Applicant-contracted right-of-way agents) in each county and the appropriate mitigation ratio, as discussed above. Mitigation funds will be provided to and held by The Nature Conservancy of Texas. A committee consisting of representatives of the Service, The Nature Conservancy of Texas, Texas Parks and Wildlife Department, and other members will be set up to determine how best to use these funds for the black-capped vireo. Disbursement of mitigation funds will be appropriated to conservation efforts within the recovery region in which impacts occur and will be commensurate to assessed mitigation costs, except where the committee determines that aggregate funds would provide the greatest conservation benefit for the species.

If sufficient funds are generated to buy a preserve, it would be managed by a third party. Preserve habitat patches will typically contain a minimum of 50 acres (20 hectares) if meeting defined criteria: patch occupancy by several territories, landscape position within a few miles of other source populations, management plan in perpetuity, and patch buffered from noncompatible land uses (Omar Bocanegra, the Service, pers. comm. to J. Williamson, Atkins [formerly PBS&J], July 6, 2011). Increased patch size may alleviate the necessity of multiterritory occupancy and buffer size. It may be possible to acquire a preserve that contains habitat for both the black-capped vireo and golden-cheeked warbler. If such is the

case, sufficient funds may become available for such a purchase more rapidly, since mitigation funds for these species could be combined. A Service-approved time limit for spending the mitigation funds will be established. All funds will be provided prior to any clearing or construction activities on each project identified as occurring within known occupied habitat or potential habitat with assumed presence. Any habitat that is acquired as result of these funds will be managed and protected for the black-capped vireo in perpetuity.

6.4.10 Red-Cockaded Woodpecker

6.4.10.1 New Facilities

As noted in Section 6.2.2, the Applicant will, when routing new transmission lines, avoid and route around, where possible, known populations and suitable habitat of the red-cockaded woodpecker. Covered projects will be assessed on a project-by-project basis for the likely occurrence of red-cockaded woodpecker habitat. When covered projects are proposed in counties identified as within the range of this species in the proposed Permit Area the Applicant or its consultant will conduct field habitat assessment surveys to determine potential habitat prior to commencement of the activities. If unavoidable potential habitat is identified by habitat assessment surveys, the Applicant has the option to assume red-cockaded woodpecker presence (i.e., presence of an active cluster within 0.5 mile of construction activities) or to have a qualified federally permitted biologist perform a presence/absence survey. If the project schedule allows, presence/absence surveys for the red-cockaded woodpecker will be conducted in areas of potential habitat prior to clearing or construction activities. The need for habitat assessment surveys will be determined by reviewing updated records of known occurrences, cover maps that identify pine and pine-hardwood stands, and aerial photography. The need for presence/absence surveys will be determined by the field habitat assessment surveys. In addition, consultation with Federal and state biologists and other experts will be continued.

Habitat assessment and presence/absence surveys of the proposed rights-of-way in areas of potential habitat will be conducted any time throughout the year prior to construction to determine potential habitat and occupancy; however, roost checks to determine baseline population numbers will be conducted prior to the nesting season (mid-March) and completed before young birds begin to leave the nest cavities (end of May), with follow-up roost checks after the breeding season (late July to mid-August). Surveys will be performed in accordance with the most recent Service protocols, which are currently defined in the “Recovery Plan for the Red-cockaded Woodpecker (*Picoides borealis*) Second Revision” (Service 2003b). Presence/absence surveys will be conducted by Service-permitted individuals familiar with the appearance and vocalization of this species and its preferred habitat. The need for presence/absence surveys will be determined from habitat assessment surveys performed by a federally permitted qualified biologist(s) employed or contracted by the Applicant.

Surveys are used to determine whether the nesting and/or foraging habitat of a red-cockaded woodpecker group would be adversely impacted by a proposed project. Impacts would be assessed at the stand level,

where a stand is refers to a wooded area receiving past or current silvicultural treatment as a single management unit, or any subset of a tract of wooded land, divided by biological community type, management history, or any other reasonable approach. Suitable nesting habitat consists of pine, pine-hardwood, and hardwood-pine stands that contain pines 60 years in age or older, while suitable foraging habitat consists of a pine or pine-hardwood stand of forest, woodland, or savannah in which 50 percent or more of the dominant trees are pines and the dominant pine trees are generally 30 years in age or older. The determinations will be undertaken prior to the initiation of any project that calls for the removal of pine trees 30 years or older; typically such trees will have a diameter at breast height (4.5 feet [1.37 meters]) of at least 10 inches (25.4 centimeters) or larger.

It is not anticipated that covered activities for existing facilities will impact nesting habitat. Furthermore, active colonies will be avoided in the routing of new facilities. Where unavoidable impacts are anticipated for potentially suitable nesting habitat, the area will be surveyed for cavity trees and active clusters by a qualified federally permitted biologist. Where no suitable nesting habitat is present within the project impact area, but suitable foraging habitat is present and will be impacted, potential use of this foraging habitat by groups outside the project boundaries will be determined. This will be accomplished by identifying any potential nesting habitat within 0.5 mile (0.8 kilometer) of the suitable foraging habitat that would be impacted by the project. Determination of suitable nesting habitat may be based on existing stand data, aerial photo interpretation, and/or field reconnaissance. Either the Applicant will assume that potentially suitable nesting habitat is occupied or have a qualified federally permitted biologist(s) perform presence/absence survey according to Service protocol.

Where presence/absence surveys are conducted, north-south transects will be run through potential nesting habitat (because many cavity entrances face a westerly direction) 50 to 100 yards (46 to 91 meters) apart depending on the density of the midstory. All medium-sized and large pines will be inspected for evidence of cavity excavation by red-cockaded woodpeckers. When cavity trees are found, their location will be recorded in the field using a Global Positioning System (GPS) unit, aerial photography, and/or field map. If cavity trees are found, more intense surveying within 1,500 feet (457 meters) of each cavity tree will be conducted to locate all cavity trees in the area. If no active clusters are present, then a “no effect” determination would be appropriate for potential impacts to the suitable foraging habitat. Conversely, if one or more active clusters are found, a foraging habitat analysis will be conducted to determine whether sufficient amounts of foraging habitat would remain after construction of the proposed project. The Applicant will mitigate impacts to red-cockaded woodpecker nesting and foraging habitat as appropriate and commensurate with impacts.

The clearing of mature pine forest for the construction of linear facilities will be avoided where practicable. When construction adjacent to red-cockaded woodpecker cluster boundaries is necessary, it will be conducted during daylight hours, avoiding activities within one to two hours of dawn or dusk, and outside of the breeding/nesting season (March through July) to avoid possible impacts on roosting and breeding success. Impacts to foraging habitat may still occur. Where suitable or potential habitat cannot be avoided, the Applicant will minimize habitat fragmentation by paralleling other existing rights-of-way,

choosing routes that avoid the removal of potential or known cavity trees, and selecting routes that avoid or minimize tree removal in cluster sites and foraging habitat. The Applicant will maintain a buffer zone of 300 to 1,300 feet (91 to 396 meters), or 0.25 mile (0.4 kilometer), from the cluster sites to avoid isolating them from foraging areas (Campbell 2003). Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed, unless they qualify as danger trees.

6.4.10.2 Existing Facilities

Except for emergency responses, if maintenance activities of an existing line are to occur in the vicinity of a known population of this species or within potential habitat, field surveys will be conducted prior to commencement of the activities, according to the aforementioned protocol for the species. If the project schedule allows, presence/absence surveys will be performed and impacts mitigated based on an assessment of habitat quality, as stated above. In cases where presence/absence surveys are not practical, presence will be assumed, take avoidance measures will be implemented, and take of potential habitat will be compensated according to the mitigation structure established below. Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed unless they qualify as danger trees. Herbicide and pesticide application will be minimized. The Applicant or its contractor will use only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) and comply with Service (2004e) guidelines for pesticide application.

6.4.10.3 Mitigation for Unavoidable Impacts

It is anticipated that the avoidance, minimization, and conservation measures described above and in sections 6.2.1, 6.2.2, and 6.2.3 will avoid or minimize adverse impacts to the red-cockaded woodpecker. Some covered activities, however, even with the implementation of these measures could lead to incidental take of red-cockaded woodpecker habitat. If known occupied or potential habitat with assumed presence will be impacted, the Applicant will provide mitigation funds. The acreage of take within each county in which the activities will occur and the most recent land prices (cost per acre) within each county will be determined. The mitigation cost will be a summation of the total acreage impacted (as determined by qualified biologists) multiplied by the most current cost per acre (as determined by the Applicant or Applicant-contracted right-of-way agents) in each county and the respective mitigation ratio, as determined by the survey methods detailed above or at 2:1 (i.e., 2 acres of mitigation for 1 acre of impact) where potential foraging habitat has assumed presence. The proposed mitigation structure for impacts to red-cockaded woodpecker foraging habitat are presented in Table 6-6, and are based on sound biological principles elaborated on in the recovery plan (Service 2003b). An estimated acreage of take for the red-cockaded woodpecker is presented in Table 6-2 and is discussed in more detail in Section 5. This take is for direct impacts from both existing and new facilities and for indirect impacts from new facilities.

Table 6-6. Mitigation Ratio Structure for Red-cockaded Woodpecker

Impacted Habitat	Mitigation Ratio ¹
Unoccupied habitat (nonhabitat) ²	0
Poor quality foraging habitat greater than 0.25 but less than 0.50 mile (0.40 and 0.80 kilometer, respectively) from an active colony	0.5:1
Good quality foraging habitat greater than 0.25 but less than 0.50 mile (0.40 and 0.80 kilometer, respectively) from an active colony	1:1
Poor quality foraging habitat less than 0.25 mile (0.40 kilometer) from an active colony	1.5:1
Good quality foraging habitat less than 0.25 mile (0.40 kilometer) from an active colony	2:1

¹ Mitigation ratio is acre(s) of mitigation to acres of impact.

² Includes potential foraging habitat, as defined in the recovery plan, lacking an active colony within 0.50 mile (0.80 kilometer) and nonhabitat.

The Applicant will provide mitigation funds to The Conservation Fund. A committee consisting of representatives of the Service, The Conservation Fund, The Nature Conservancy of Texas, and other Service-approved members will be set up to determine how best to use these monies for the red-cockaded woodpecker. Disbursement options include, but are not limited to, allocating monies to buy tracts of land to add to the Angelina National Forest or Sabine National Forest, to fund habitat management or restoration activities in support of the species' recovery by The Nature Conservancy, The Conservation Fund, or other nonprofit organization(s), on existing lands held for red-cockaded woodpecker conservation or to acquire land for red-cockaded woodpecker conservation by such entities. One such option would be acquisition of Temple-Inland or other private tracts, containing, adjacent to, or nearby active colonies, on which to restore red-cockaded woodpecker habitat through such activities as planting longleaf pine and performing prescribed burns. Further, mitigation funds may be disbursed to promote red-cockaded woodpecker conservation through large-scale, regional efforts, such as the Service's East Texas Ecosystem Plan. A Service-approved time limit for spending the mitigation funds will be established. All funds will be provided prior to any clearing or construction activities on each project identified as occurring within known occupied habitat or potential habitat with assumed presence, as further described under Funding (Section 10) of this document.

6.4.11 Louisiana Black Bear

6.4.11.1 New Facilities

As noted in Section 6.2.2, the Applicant will, when routing new transmission lines, avoid and route around, where practical, known populations and suitable habitat of the Louisiana black bear. Covered projects will be assessed on a project-by-project basis for the likely occurrence of occupied Louisiana black bear habitat. When covered projects are proposed in counties identified as within the range of this species within the proposed Permit Area, prior to commencement of the activities, the Applicant or its consultant will conduct field habitat assessment surveys to determine potential habitat. If unavoidable

potential habitat is identified by habitat assessment surveys, the Applicant has the option to assume Louisiana black bear presence and to mitigate at a 1:1 ratio or to have a qualified federally permitted biologist conduct presence/absence surveys according to Service protocols in which case mitigation would only be provided if presence was verified. The need for surveys will be determined by reviewing updated records of known occurrences and aerial photography. In addition, consultation with Federal and state biologists and other experts will be continued. The Service is currently unaware of any reproducing bear populations (neither the Louisiana black bear nor the American black bear) in East Texas and, thus, no occupied habitat has been documented in that part of the state (Omar Bocanegra, the Service, pers. comm. to D. Green, PBS&J, December 2009). However, it is possible that occupied habitat may be discovered during the 30-year term of the permit. Therefore, those projects containing suitable black bear habitat will be coordinated with the Service's East Texas Suboffice to determine the need for presence/absence surveys.

If avoidance is not possible, minimization efforts will include, but are not limited to, avoiding damage to den trees, den sites, or candidate den trees; avoiding dissection of contiguous forest, wherever practical; reducing rights-of-way width if practical; and limiting human disturbance. These are discussed below.

Because of the importance of denning sites to the preservation of Louisiana black bears (Elowe and Dodge 1989), Applicant construction and maintenance activities for covered projects will avoid damaging Louisiana black bear den trees, den sites, and candidate den trees whenever possible (Stewart 2000). Preserving these habitats would increase the potential for successful winter dormancy periods and reproduction (Black Bear Conservation Committee 2005).

Remoteness is an important spatial feature of Louisiana black bear habitat that is relative to forest tract size and the presence of roads (Service 1995a). Dissecting patches of continuous forest, especially those made up of bottomland hardwood species, will be avoided whenever practical during routing of covered projects. Additional fragmentation will be avoided or reduced by paralleling existing rights-of-way where practicable.

Black bears are very sensitive to human disturbance (Service 1995a); thus, opportunities for such an occurrence will be kept to a minimum. Gates or permanent road closures will be installed at access points to prevent public use of rights-of-way within potential Louisiana black bear habitat, thereby reducing human disturbances and the chance for human/bear encounters (Stewart 2000).

Maintenance of openings in heavily forested areas promotes the production of soft mast, which forms a portion of black bear diet (Black Bear Conservation Committee 2005). Plants common to forest edges, such as blackberries and dewberries (*Rubus* spp.), pokeweed (*Phytolacca americana*), elderberry (*Sambucus* spp.), and devil's walking stick (*Aralia spinosa*), are beneficial to bears and are likely to occur along the edges of the rights-of-way. To promote the existence of these plants, rights-of-way through heavily forested areas in potential bear habitat will be bush-hogged. The use of herbicides will be kept to a minimum, and where used, only appropriate herbicides and application methods that limit impacts on

nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) will be selected, to the maximum extent practicable.

Large mammals such as the black bear tend to cause damage to wooden structures (Stewart 2000). Whenever practical, the Applicant will use materials other than wood, such as steel, for transmission line poles in areas potentially occupied by the Louisiana black bear. Use of stronger materials would reduce harm to bears as well as damage to the poles.

6.4.11.2 Existing Facilities

Except for emergency responses, if maintenance activities of an existing line are to occur in the vicinity of a known population of this species or within potential habitat, field surveys will be conducted prior to commencement of the activities. Taller trees adjacent to the rights-of-way will be topped or trimmed to the minimum amount necessary to comply with National Safety Codes, but will not be entirely removed unless they qualify as danger trees. Herbicide and pesticide application will be minimized. The Applicant or its contractor will use only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) and comply with Service (2004e) guidelines for pesticide application.

6.4.11.3 Mitigation for Unavoidable Impacts

It is anticipated that the avoidance, minimization, and conservation measures described above and in sections 6.2.1, 6.2.2, and 6.2.3 will avoid or minimize adverse impacts to the Louisiana black bear. Some covered activities, however, even with the implementation of these measures, could lead to incidental take.

If known occupied or potential habitat with assumed presence will be impacted, the Applicant will provide mitigation funds. The acreage of take within each county in which the activities will occur and the most recent land prices (cost per acre) within each county will be determined. The mitigation cost will be a summation of the total acreage impacted (as determined by qualified biologists) multiplied by the most current cost per acre (as determined by the Applicant or Applicant-contracted right-of-way agents) in each county. Mitigation for impacts will be at a 1:1 ratio (i.e., 1 acre of mitigation for 1 acre of impact). An estimated acreage of take for the Louisiana black bear is presented in Table 6-2 and is discussed in more detail in Section 5. This take is for direct impacts from new facilities. No existing facilities occur in potential habitat for the Louisiana black bear. Because of BMPs currently being used and avoidance, minimization, and conservation measures, the Applicant believes that indirect impacts from new facilities will be avoided.

The Applicant will provide mitigation funds to The Conservation Fund. As noted above, the Service is currently unaware of any reproducing bear populations in east Texas and, thus, no occupied habitat has been documented in that part of the state. A committee consisting of the Service, the Conservation Fund,

and other Service-approved members will be set up to determine how best to use these monies for the Louisiana black bear. At present, no conservation bank exists for the Louisiana black bear, to the Applicant's knowledge. Should such banks be developed and credits available, purchase of conservation credits will be the preferred mitigation strategy. Alternatively, mitigation funds may be efficaciously disbursed to promote Louisiana black bear conservation through large-scale, regional efforts, such as the Service's East Texas Ecosystem Plan, or those of the East Texas Black Bear Task Force of the Black Bear Conservation Coalition. A Service-approved time limit for spending the mitigation funds will be established. All funds will be provided prior to any clearing or construction activities on each project identified as occurring within known occupied habitat or potential habitat with assumed presence, as further described under Funding (Section 10) of this document. The rationale for this determination is discussed above within the respective sections for existing facilities.

6.4.12 Other Species of Special Interest

As noted in Section 3.3, several other federally listed species, as well as several Federal candidate species, occur in the proposed Permit Area. The 13 federally listed species and 2 species proposed for federal listing addressed in Section 3.3 consist of 2 plants, the endangered Texas prairie dawn-flower and a threatened plant with no common name (*Geocarpon minimum*); 2 endangered invertebrates, the Pecos assiminea snail and the Bee Creek Cave harvestman; 3 endangered fish, the Leon Springs pupfish, Comanche Springs pupfish, and Pecos gambusia; 2 reptiles, the threatened Concho Watersnake and the proposed endangered dunes sagebrush lizard; and 6 birds, the endangered northern aplomado falcon, interior least tern, and southwestern willow flycatcher, and the threatened piping plover and Mexican spotted owl, and the proposed threatened mountain plover.

The 16 candidate species are as follows: 3 plants, the Guadalupe fescue, Neches River rose-mallow, and Texas golden gladecegrass; 5 aquatic invertebrates, the Phantom Lake Cave snail, Diamond Y Spring snail, Phantom Spring snail, Gonzales Spring snail, and diminutive amphipod; 2 fish, the smalleye shiner and sharpnose shiner; 2 amphibians, the Salado salamander and Jollyville Plateau salamander; 1 reptile, the Louisiana pinesnake; and 3 birds, the lesser prairie-chicken, Sprague's pipit, and yellow-billed cuckoo. Candidate species are those species for which enough information about their vulnerability and threat(s) is available to propose them for listing as endangered or threatened. Typically, however, they are precluded from listing by higher priority listing activities.

Because of the restricted range of these species, the standard BMPs that the Applicant typically uses, and the avoidance, mitigation, and conservation measures described for the covered species, the Applicant believes that impacts to these species will be avoided, as described in Section 5.3 of this document. Therefore, no incidental take authorization for these species is being requested, and take of these species would not be authorized by issuance of the requested permit.

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7.0 IMPLEMENTATION

All avoidance, minimization, and mitigation measures will be implemented by the Applicant. All construction phase minimization measures/BMPs will be implemented by the Applicant or its contractors, including limitations on seasonal clearing and taking appropriate precautions to prevent the spread of oak wilt. The Applicant will include construction phase avoidance/minimization measures and BMPs on its construction plans and inspect all work by construction contractors to ensure adherence to the plans. Additionally, an onsite environmental monitor will be provided or contracted by the Applicant to ensure adherence to all avoidance, minimization, and conservation measures and BMPs.

The Applicant's implementation responsibilities will include finalizing a contract and management agreement with a Service-approved third party or parties, such as The Nature Conservancy of Texas, Conservation Fund, and Lady Bird Johnson Wildflower Center, and buying mitigation credits from a Service-approved conservation bank or providing mitigation funding as discussed in Section 6.4. All proposed agreements will be submitted to the Service for review, approval, and signature.

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8.0 ADAPTIVE MANAGEMENT

Adaptive management is a tool that addresses uncertainty in the conservation of species covered by an HCP. The process allows newly acquired information and experience to be incorporated into future management plans. Given the limited data with which some of the conservation decisions were made, it is only to be expected that over the life of the proposed permit new data and management techniques will become available. Adaptive management would allow this information to be used to streamline and improve the decision-making process for the conservation program and to ensure that management changes in response to new, appropriate data are implemented in a timely fashion. Monitoring of covered activities for biological impacts, the implementation and effectiveness of avoidance, minimization, and conservation measures, and BMPs, and the efficacy and contribution of mitigation measures towards reaching the biological goals of this HCP will be tracked and evaluated through the annual reporting process (Section 9). Continued coordination and correspondence with the Service will facilitate the adaptive management process and better ensure completion of biological objectives and attainment of biological goals over the 30-year permit duration.

The Service developed a framework for addressing adaptive management in HCPs that includes (1) identifying areas of uncertainty and questions that need to be addressed to resolve the uncertainty; (2) developing alternative management strategies and determining which experimental strategies to implement; (3) integrating a monitoring program that is able to acquire the necessary information for effective strategy evaluation; and (4) incorporating feedback loops that link implementation and monitoring to the decision-making process that result in appropriate changes in management. These components of the adaptive management process will be explicitly addressed in reporting (Section 9).

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9.0 REPORTING

The Applicant will provide an Annual Report due on January 1 of each year to the Service (Austin Ecological Services Field Office, 10711 Burnet Road, Suite 200, Austin, Texas 78758; Arlington Ecological Services Field Office, Winsystems Center Building, 711 Stadium Drive, Suite 252, Arlington, Texas 76011-6247; and the regional Office, P.O. Box 1306, Room 4102, Albuquerque, New Mexico 87103). This report will document the activities and Applicant's permit compliance for the previous year, thus documenting progress toward the goals and objectives of the HCP and demonstrating compliance with the terms and conditions of the incidental take permit. The annual report will include descriptions of the covered activities undertaken for installation of new facilities and repair/maintenance of existing facilities; a description, including acreage, of occupied habitat impacted; a description, including acreage of potential habitat taken; a county-by-county tally (and for the golden-cheeked warbler and black-capped vireo a tally by recovery region) of the amount of habitat directly or indirectly impacted to ensure that the authorized level of take is not exceeded; fees assessed; an account of all mitigation credits purchased and mitigation fees paid and receipts received, identified by activity, project, species impacted, and county; an evaluation of the effectiveness of the avoidance, minimization and conservation measures and BMPs; an evaluation of the implementation and effectiveness of the terms of the Permit, including financial obligations; recommendations for improvement; and any other appropriate information to document Applicant's compliance with the Permit. The annual report will also include the results of any presence/absence or habitat assessment surveys.

This annual review will also allow the Applicant and the Service to evaluate the effectiveness of the avoidance, minimization and conservation measures and BMPs, and to develop adaptive management actions, if warranted, to better ensure goal attainment. As noted in Section 3, available information on the covered species is often limited due to the rarity of the species. As new data become available, adaptive management would allow the Service and the Applicant to modify existing measures or develop alternative strategies that are acceptable to both parties.

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10.0 FUNDING

If Applicant commences habitat modification before mitigation measures are substantially completed, Applicant will arrange for an unconditional irrevocable stand-by letter of credit to be issued to the Service in the amount of the expected mitigation cost, as calculated in Section 6 of this HCP (the “Letter of Credit”). The Letter of Credit shall be issued by a nationally recognized banking institution acceptable to the Service having its principal place of business in the United States and shall have an expiration date that extends through the expected completion date of the mitigation measures or other date as mutually agreed upon. The Letter of Credit shall authorize and obligate the issuer to pay the designated organization, upon demand (but in no case earlier than the later of (i) [60] days prior to the Service’s expected commencement of substantial mitigation activities, or (ii) 15 days prior to the expiration of the letter of credit), by a draft against the Letter of Credit the amount that the designated has determined in good faith is required to fulfill and perform the mitigation work to the extent such mitigation work has not been performed by Applicant. Presentment by the designated organization to the issuer of a sworn affidavit of the foregoing and a copy of the Letter of Credit shall accompany any demand made by the designated organization.

In the event that the Letter of Credit expires prior to the substantial completion of the required mitigation measures, Applicant shall cause the issuer to issue an additional letter of credit to the designated organization (the “Supplemental Letter of Credit”). The Supplemental Letter of Credit shall be subject to the same terms as the Letter of Credit.

Mitigation funds generated by the requested permit for a particular species will be used for conservation projects that would promote the recovery of that species. The mitigation funds will be used to purchase mitigation credits at a Service-approved conservation bank or deposited directly into restricted accounts managed by a Service-approved third party, such as The Nature Conservancy of Texas, Conservation Fund, and Lady Bird Johnson Wildflower Center. While funds are not required at the time of permit application, they must be provided prior to incidental take. As such, these funds will be provided prior to any clearing or construction activities within identified habitat of any of the permitted species. The amount of mitigation funds will be determined as discussed in Section 6.4. Consultation with the Service will be continued to assure that fair and equitable mitigation ratios are determined that are appropriate for the covered species, and amendments may be completed through procedures described in Section 12 (Permit Amendment Procedure). Deposit of all mitigation funds and conservation credit acquisition will be documented in the annual report summarizing permit-related activities during the year in which the deposits were made or credits were purchased.

Where appropriate, committees will be set up for each species to determine the best use of the monies generated by the requested permit for the benefit of that species. Each committee will consist of a Service-approved third party such as The Nature Conservancy of Texas, Conservation Fund, or Lady Bird Johnson Wildflower Center; a representative of the Service; a representative from the Applicant; and,

where appropriate, a species-specific Service-approved expert. All disbursement of funds would be approved by the Service. The agreement with the third parties will include a Service-approved time limit for spending the mitigation funds. Potential uses include land acquisition (either by fee simple purchase or conservation easements) and management, habitat management, and research. Each committee would be headed up by entities such as The Nature Conservancy of Texas, Conservation Fund, or Lady Bird Johnson Wildflower Center.

11.0 NO SURPRISES POLICY

The Service provides economic and regulatory assurances under the No Surprises policy (63 *Federal Register* 8859, codified at 50 CFR §§17.22, 17.32, 222.2) to incidental take Permittees, providing that an approved HCP is being properly implemented, that no additional land use restrictions or financial compensation will be required of the Permittee with respect to covered species, even if unforeseen circumstances arise after the permit is issued indicating that additional mitigation is needed. These assurances give Permittees certainty regarding the costs of mitigation and conservation of protected species.

The No Surprises rule recognizes that the Permittee and the Service can reasonably anticipate and plan for some changes in circumstances affecting a species or geographic area covered by an HCP (e.g., the listing of additional species as threatened or endangered, or a natural catastrophic event in areas prone to such events). To the extent that changed circumstances are provided for in the HCP, the Permittee must implement the appropriate measures in response to the changed circumstances if and when they occur. The following sections describe the changed circumstances anticipated by and provided for in the HCP and explains the Service's assurances to the Applicant with respect to any unforeseen circumstances.

11.1 CHANGED CIRCUMSTANCES

Changed circumstances are defined as “circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and the Service and that can be planned for . . .” (63 *Federal Register* 8859). An HCP must identify provisions to help compensate for any negative impacts to covered species from changed circumstances to qualify for No Surprises assurances. If the Service determines that a changed circumstance has occurred, the Permittee must implement any provisions included in the HCP and/or incidental take permit that address such circumstances. If a changed circumstance has not been addressed by the HCP and/or incidental take permit, the Service will not require additional conservation or mitigation measures of the Permittee, provided that the terms of the HCP and incidental take permit are being properly implemented. Under these conditions, any additional conservation measures deemed necessary by the Service to compensate for a changed circumstance could be implemented at the expense of the Service.

The Applicant and the Service recognize that many changes in human conditions and attitudes, development pressures, and scientific understanding of ecological systems, among other things, will occur over the 30-year life of the permit. To address this issue, the HCP contains a procedure through which the Service and the Applicant will deal with reasonably anticipated changes in circumstances affecting the species covered by the HCP.

Changed circumstances that can be reasonably anticipated by the Service and the Applicant and planned for are emergency repair, oak wilt, exceedance of whooping crane take due to ineffectual minimization

and mitigation measures, development of covered species habitat in newly created rights-of-way, new species become federally listed, covered species become delisted, and covered species become extinct.

11.1.1 Emergency Repair

Emergency repair situations are foreseeable, though not expected, by the Applicant and could represent a changed circumstance. Damage to existing and future facilities caused by weather or other factors may require emergency repair. It is possible that damaged lines or emergency repair operations could necessitate activities that may impact endangered species habitat outside of existing rights-of-way. Quick action to repair damaged or threatened lines is absolutely necessary to protect the safety of people and property in the vicinity of existing and future facilities and to maintain a dependable source of electricity to energy customers. As such, the Applicant can conduct any emergency repairs or emergency maintenance on the existing and future facilities as needed without prior notification to the Service.

The Applicant will notify the Service within 10 working days of any utility related activity that occurs in potential or known habitat for any of the covered species, outside of the rights-of-way of existing and future facilities, such as from emergency repair or maintenance situations. The Service will then determine whether the activity resulted in a changed circumstance with respect to covered species. If the Service determines that a changed circumstance has occurred, the following measures will be implemented:

- The Applicant and the Service will determine the amount of negative impacts to the covered species as a result of the changed circumstance based on the best available information.
- The Service will determine whether additional mitigation is needed to offset any negative impacts of the changed circumstance.
- If additional mitigation is needed, the Applicant will work with the Service to prepare a written plan that identifies how the Applicant will mitigate for the additional impacts to the maximum extent practicable.

Once the mitigation plan is approved by the Service, the Applicant will implement the mitigation plan.

11.1.2 Oak Wilt

Oak wilt precautions (as discussed in Section 6) will help ensure that construction and maintenance activities do not cause long-term damage to habitat adjacent to the rights-of-way and indirect negative effects to associated species. However, should oak wilt occur as a result of the Applicant's activities, the Applicant will follow the current recommendations by the Texas Forest Service or a professional arborist to reduce the further spread of the fungus. Approaches include, but are not limited to, removal and treatment of infected trees to prevent spore mat formation and controlling infection centers by trenching and vibratory plowing to disrupt grafted root systems to prevent spread.

11.1.3 Exceedance of Whooping Crane Take Due to Ineffectual Minimization and Mitigation Measures

Proposed conservation measures for the whooping crane include the avoidance of potential stopover habitat in routing new facilities, minimization of incidental take through installation of bird flight diverters on those sections of new transmission lines within 1 mile (1.6 kilometers) of potentially suitable stopover habitat in the whooping crane migration corridor, and mitigation of adverse impacts through installation of bird flight diverters on an equivalent length of existing transmission line or distribution line within 1 mile (1.6 kilometers) of potentially suitable stopover habitat in the migration corridor when those lines are temporarily taken out of service. While such marking techniques have been shown to reduce the risk of line strike by 50 to 80 percent (Morkill and Anderson 1991, Brown and Drewien 1995, Yee 2008), migrating whooping cranes could still become victims of collisions with powerlines. Should monitoring efforts indicate that the conservation measures prescribed by the HCP are ineffectual in minimizing incidental take of whooping cranes and may therefore lead to permit noncompliance, the Service will work with the Applicant to identify measures necessary to achieve this goal of avoidance and minimization of incidental take, with compensatory mitigation where take is unavoidable. The Applicant will implement these measures until the permit is amended to address such issues.

11.1.4 Louisiana Black Bear Repatriation

At present, only three breeding populations of the Louisiana black bear are known to occur: one in the Tensas River Basin and two in the Atchafalaya River Basin in Louisiana. All three breeding populations are considered demographically isolated (Texas Parks and Wildlife Department 2005). As such, The Service is currently unaware of any reproducing bear populations (neither the Louisiana black bear nor the American black bear) in East Texas and, thus, no occupied habitat has been documented in that part of the state (Omar Bocanegra, the Service, pers. comm. to D. Green, PBS&J, December 2009). However, given the recorded occurrence of the species in 10 counties in the proposed Permit Area and conservation efforts to repatriate the Louisiana black bear to its historic range, both existing (e.g., East Texas Black Bear Conservation and Management Plan [Texas Parks and Wildlife Department 2005] and the East Texas Black Bear Task Force) and foreseeable, of which does not exclude reintroduction to East Texas, it is possible that occupied habitat may be discovered during the 30-year term of the permit. Therefore, those projects containing suitable black bear habitat will be coordinated with the Service's East Texas Suboffice to determine the need for presence/absence surveys. If occupied habitat is discovered during the 30-year life of the permit, the Service will amend the biological opinion to do a jeopardy analysis and at that time help identify how the funds would be used for the Louisiana black bear.

11.1.5 Development of Covered Species Habitat in Newly Created Rights-of-Way

If maintenance activities such as mowing, brush clearing, or tree trimming in a newly created rights-of-way is not conducted on a regular basis, habitat for covered species may develop within the rights-of-way.

Given the mature habitats required for covered species such as the golden-cheeked warbler, red-cockaded woodpecker, and Louisiana black bear, the required habitat will not have time to develop in the rights-of-way. Black-capped vireos, however, are known to utilize regrowth woody vegetation in rights-of-way, particularly overhead transmission lines. Black-capped vireo habitat could develop within new rights-of-way after the initial clearing if the area is not recleared at sufficient intervals during the operation of new facilities (generally less than 5 years). This could result in the creation of new black-capped vireo habitat in the rights-of-way for which negative impacts associated with future operation and maintenance activities, such as brush clearing, are currently unknowable and therefore not covered by the proposed permit.

The development of new black-capped vireo habitat in newly cleared rights-of-way after construction is a foreseeable event, but not expected, as the Applicant will clear the rights-of-way as practicable to prevent the potential development of black-capped vireo habitat. It is the Applicant's intent to keep newly cleared rights-of-way maintained to prevent the reestablishment of black-capped vireo habitat.

The Applicant will maintain records of clearing activities within newly cleared rights-of-way. If more than 5 years have passed since the rights-of-way was last cleared, the Applicant will implement the following procedures prior to any further brush clearing:

- The Applicant will conduct a habitat assessment to determine whether black-capped vireo habitat occurs within the rights-of-way. The habitat assessment will include field inspections of current conditions and a delineation of habitat.
- If black-capped vireo habitat is determined to exist within the rights-of-way, the Applicant will notify the Service of the intent to clear brush and submit the results of the habitat assessment to the Service. If no potential black-capped vireo habitat is observed within the rights-of-way, the Applicant may clear brush within 6 months of the date of the habitat assessment without further coordination with the Service.

11.1.6 New Species Become Federally Listed

In the event that a species becomes listed under the ESA or is currently listed but not covered under the proposed permit and may be affected by covered activities, the Service will determine if current conservation measures in the HCP are sufficient to avoid take of, jeopardy to, or adverse modification of critical habitat for the newly listed species. If not, the Service will work with the Applicant to identify measures necessary to achieve this goal. The Applicant will implement these measures until the permit is amended to include such species, or until the Service notifies the Applicant that such measures are no longer necessary. The Service may also determine that the new species requires a new HCP or some other form of action under the ESA.

11.1.7 Covered Species Become Delisted

It is always the goal of the ESA to conserve endangered and threatened species to ensure their long-term survival in the wild and, eventually, to delist the species. For delistings that result from recovery, the ESA requires that the Service monitor the species for at least 5 years to assess the ability of the species to sustain themselves without the protection of the ESA. If one or more of the covered species becomes delisted through recovery during the 30-year life of the Permit, the Applicant would discuss with the Service any potential changes or amendments to the HCP or Permit conditions that may be appropriate under this changed condition.

11.1.8 Covered Species Become Extinct

Despite conservation efforts intended to benefit listed species, including this HCP, it is possible that one or more of the covered species could become extinct during the 30-year life of the Permit. If such proves to be the case, the Applicant and the Service may negotiate an amendment to the HCP and Permit to remove the conservation obligations with respect to the extinct species.

11.1.9 Changed Circumstances Not Provided for in the Plan

If additional conservation or mitigation measures are determined to be necessary to respond to changed circumstances and such measures were not provided for in the HCP, the Service will not require any conservation or mitigation measures in addition to those provided for in the HCP without the consent of the Applicant, provided that the HCP is being properly implemented.

11.2 UNFORESEEN CIRCUMSTANCES

Unforeseen circumstances are “changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers or the Service at the time of the conservation plan's negotiation and development, and that result in a substantial and adverse change in the status of the covered species” (50 CFR 17.3). The No Surprises policy assures incidental take Permittees that the Service will not require additional mitigation or resources (other than those available under the original terms of the conservation plan) without the consent of the Permittee (63 *Federal Register* 8859).

The No Surprises policy states that the Service may require additional conservation measures of an incidental take Permittee as a result of unforeseen circumstances “only if such measures are limited to modifications within conserved habitat areas, if any, or to the conservation plan’s operating conservation program for the affected species, and maintain the original terms of the conservation plan to the maximum extent possible.” The Service will not require the commitment of additional land, water, or financial resources by the Permittee without the consent of the Permittee, or impose additional restrictions on the use of land, water, or other natural resource otherwise available for use by the Permittee under the original terms of the incidental take permit. No Surprises assurances apply only to the species adequately

covered by the HCP, and only to those Permittees who are in full compliance with the terms of their HCP, incidental take permit, and other supporting documents. This HCP adequately covers the 11 federally listed covered species, and the Applicant is eligible for the assurances of the No Surprises policy pertaining to these species.

The Service will have the responsibility of demonstrating that unforeseen circumstances exist, basing that determination on the best scientific and commercial data available. The Service will notify the Applicant in writing of any unforeseen circumstances that the Service believes to exist. The Service determines whether unforeseen circumstances have occurred based on, but not limited to, the following considerations (63 *Federal Register* 8871):

- Size of the current range of the affected species.
- Percentage of range of covered species adversely affected by the HCP.
- Percentage of range of covered species conserved by the HCP.
- Ecological significance of that portion of the range affected by the HCP.
- Level of knowledge about the affected species and the degree of specificity of the species' conservation program under the HCP.
- Whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

A determination by the Service that unforeseen circumstances exist must be documented and based upon reliable technical information regarding the status and habitat requirements of the affected species. In the case of an unforeseen circumstance, the Service, any Federal, state, or local government agency, nongovernment organization, or private entity may take any actions necessary in order to conserve a species, as long as the actions are at the expense of that organization and the approval of the Permittee is obtained.

In the event of an unforeseen circumstance, the Service will provide at least 30 days notice of a proposed finding of unforeseen circumstances to the Applicant and will work with the Applicant to develop an appropriate response to the new conditions. The Applicant will have the opportunity to submit information to rebut the proposed finding, if it deems necessary. The Service may request that the Applicant alter the HCP described in this section to address the unforeseen circumstance, provided the requested alterations are limited to the conservation program and maintain the original terms of the HCP to the maximum extent possible. Pursuant to the No Surprises policy, the Service also may not require the dedication of additional resources, including land, water, funding, or restrictions on the use of resources otherwise available for development or use by the Applicant.

12.0 PERMIT AMENDMENT PROCEDURE

Amendments to this HCP and/or the associated incidental take permit may be necessary during the term of the Permit. These amendments may include relatively minor changes to the HCP and/or incidental take permit, or major changes that substantially alter the covered activities, conservation program, or implementation of the HCP. Amendments to the HCP and associated incidental take permit may be made through an expedited administrative process or through a formal amendment procedure that would require additional notification through the *Federal Register* and NEPA analysis (Service and NMFS 1996), depending on the scope of the proposed changes. All amendments to the HCP or incidental take permit will require the consent of both the Applicant and the Service.

12.1 MINOR AMENDMENTS

Minor amendments involve routine administrative revisions or minor changes to concepts contained within this HCP that do not diminish the level or means of avoidance, minimization, and/or mitigation of potential adverse impacts to listed species or increase the level of take. They have little or no impact on the amount of incidental take authorized by the permit, the degree of negative impacts to the covered species from covered activities, or the effectiveness of the conservation program. They include administrative changes addressing the implementation of the conservation program, such as avoidance and minimization measures and reporting requirements, and minor alterations to the HCP and/or incidental take permit that could arise from changed or unforeseen circumstances, adaptive management provisions, or other circumstances.

Minor amendments may be incorporated into the HCP and/or incidental take permit administratively (without formal NEPA analysis) provided that both the Applicant and the Service agree on the proposed changes, the proposed amendments are documented in written form, and the proposed amendments do not significantly change the net effect of the covered activities on the covered species or the amount of incidental take requested in the original plan and incidental take permit. The following procedure will be used to process an administrative amendment to the HCP and/or incidental take permit:

The Applicant will submit a draft of the proposed minor amendment to the Service. The Service will review the draft amendment and provide comment on the proposal. The Service will consult with the Applicant, as needed, to reach an agreement on the requested changes. Upon reaching an agreement with the Service, the Applicant will prepare the final amendment language, including any applicable changes to other implementing documents (e.g., implementing agreement or conservation easements), and forward the proposed changes to the Service. The Service will administratively process the agreed-upon changes, and append the amendment to the HCP and other related documents, as appropriate, and make any necessary changes to the incidental take permit.

12.2 MAJOR AMENDMENTS

Major amendments are those that would substantially alter the effects of the covered projects or the conservation program. Such amendments are likely to change the amount of take or impacts authorized by the incidental take permit, and/or have a significant impact on the structure, implementation, or effectiveness of the conservation plan. Major amendments include changing the boundaries of the proposed Permit Area; reducing the amount of mitigation provided by the conservation plan; reducing the use of avoidance and minimization measures and BMPs that avoid and minimize impacts; and modifications to the HCP and/or incidental take permit that could arise from an unforeseen or changed circumstance, or other circumstances.

Incorporating major amendments may require completion of a formal amendment procedure similar to the original permit application process. This procedure may include public review through the *Federal Register*, additional analysis to comply with NEPA requirements, and an intra-Service section 7 consultation (Service and NMFS 1996).

13.0 COMPLIANCE WITH ISSUANCE CRITERIA AND POLICIES

The Secretary of the Interior (through the Service) will issue an incidental take permit provided that the applicant prepares and implements an HCP that satisfies the criteria specified in section 10(a)(2)(A) and has met the permit issuance criteria stated in section 10(a)(2)(B) of the ESA.

In accordance with section 10(a)(2)(A), the Applicant has prepared and submitted a HCP that identifies the impacts to endangered species from the proposed permitted taking (Section 5), describes avoidance, minimization, and mitigation measures that will offset the impacts of the permitted taking (Section 6), identifies the funding that will be used to implement avoidance, minimization, and mitigation measures (Section 10), and addresses alternatives to the proposed taking (Section 2).

The Applicant has also met the incidental take permit issuance criteria of section 10(a)(2)(B), such that:

1. **The proposed taking will be incidental to otherwise lawful activities.** The covered activities presented in Section 4 to be performed by the Applicant are lawful activities. All take associated with these lawful activities will be incidental to them.
2. **The Applicant will, to the maximum extent practicable, avoid, minimize, and mitigate for the impacts of such taking.** The avoidance, minimization, and mitigation measures proposed by the Applicant in Section 6 of this HCP are to the maximum extent practicable, given the Applicant's standard operating procedures, funding, capabilities, and the critical need for the covered activities. Despite these avoidance and minimization measures, the covered projects will directly and indirectly affect covered species. The Applicant proposes to mitigate for these unavoidable effects to the maximum extent practicable by buying mitigation credits from a Service-approved conservation bank or by providing funding, the disbursement of which will be determined, where appropriate, by Service-approved committees set up for each species. The level of funding will be based on an evaluation of impacted habitat within and adjacent to the project rights-of-way and a general estimation of land values in the area that may be suitable for purchase. These funds are anticipated to be used to actively benefit the covered species being impacted. This level of proposed funding will be the maximum extent practicable for the Applicant without significantly affecting the costs of providing reliable electrical service, and will be commensurate with the level of take anticipated given the necessity of the covered projects as identified in sections 1 and 2. In addition, the Applicant has included provisions for changed circumstances that are foreseeable, but not expected, which will help ensure that impacts from the proposed taking are minimized and mitigated to the maximum extent practicable.
3. **The Applicant ensures that adequate funding for the plan will be provided.** The Applicant will fund the proposed avoidance and minimization measures and BMPs and habitat mitigation costs. The Applicant has the financial capability to ensure proper planning, management, and completion of the mitigation proposal as described in this HCP. The Applicant will guarantee payment of the full mitigation amount and will provide the mitigation costs prior to any significant clearing or construction activities in known occupied habitat or potential habitat with assumed presence of each species.

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4. **The proposed taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.** Because of the avoidance, minimization, and mitigation measures proposed by the Applicant in Section 6 of this HCP, the level of take expected to occur from the covered activities will not appreciably reduce the likelihood for survival and recovery of any of the 11 covered species in the wild.
 5. **The Applicant has met other requirements imposed by the Secretary of the Interior, such as monitoring and reporting.** This HCP includes annual reporting for the life of the permit that will allow the Service to adequately monitor the implementation of the avoidance and minimization practices described in Section 6. Annual reports will be submitted by the Applicant to the local and regional offices of the Service by the reporting deadline.
 6. **The Secretary of the Interior has received assurances that the plan will be implemented.** Section 7 addresses the implementation of the HCP, including identifying how the Applicant will ensure that avoidance and minimization measures will be properly implemented. This plan for implementation provides assurances to the Service that the Applicant will fully implement this HCP.

The Service issued additional policy statements in recent years that are intended to enhance the effectiveness of the HCP process and provide assurances to landowners who are properly implementing approved HCPs. This includes the five-point policy. The Service included the five-point policy as an addendum to the Habitat Conservation Planning Handbook on July 3, 2000 (65 *Federal Register* 35242). The policy emphasizes the development of biological goals and objectives, adaptive management strategies, monitoring provisions, permit duration considerations, and public participation into HCPs as a way to increase their effectiveness. This HCP addresses each of the criteria for permit issuance and incorporates the relevant aspects of the five-point policy. These measures not only help fashion a successful plan, but also help facilitate approval by the Service, leading to permit issuance.

14.0 LIST OF PREPARERS

14.1 ONCOR ELECTRIC DELIVERY COMPANY, LLC

Liz Kirkpatrick

Experience: 15 years of industry experience in environmental assessments, permitting and compliance

EIS/HCP Role: Lead Oncor representative

Rod Kinard

Experience: 28 years of industry experience in environmental assessments, permitting, and compliance

EIS/HCP Role: Alternate Oncor representative

14.2 PBS&J

Derek Green, Senior Project Manager

Experience: 27 years of environmental assessment and impact analysis

EIS/HCP Role: Project Manager, ecology, endangered species, HCP, editor

Angela Bulger, Project Manager

Experience: 10 years of environmental ecology and document/project management

EIS/HCP Role: EIS Document Manager

Billye Breckenridge, Project Manager

Experience: 11 years of environmental and project management

EIS/HCP Role: Cumulative impacts, document review

Gary Newgord, Environmental Scientist

Experience: 3 years of environmental ecology

EIS/HCP Role: Ecology

David Kimmerling, Senior Technician

Experience: 23 years of graphics

EIS/HCP Role: Graphics

Kayleigh Rust, Planner II

Experience: 4 years

EIS/HCP Role: EIS Document Manager

John Williams, Scientist II

Experience: 3 years

EIS/HCP Role: Ecology, Cumulative Impacts (HCP)

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Appendix

Habitat-Based Prioritization for Migrating Whooping Crane Transmission Line Deterrent Efforts

***Habitat Based Prioritization for
Migrating Whooping Crane
Transmission Line Deterrent Efforts
Prepared for Oncor***

**HABITAT-BASED PRIORITIZATION FOR
MIGRATING WHOOPING CRANE
TRANSMISSION LINE DETERRENT EFFORTS**

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November 2010

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Acronyms and Abbreviations

ANWR	Aransas National Wildlife Refuge
AWBP	Aransas-Wood Buffalo Population
CWS	Canadian Wildlife Service
GIS	Geographic Information System
GPS	Geographic Positioning System
NHD	National Hydrography Dataset
NLCD	National Land Cover Database
NWI	National Wetlands Inventory
Oncor	Oncor Electric Delivery Company, LLC
PBS&J Service	Post, Buckley, Schuh & Jernigan U.S. Fish and Wildlife Service
TXDOT	Texas Department of Transportation
USGS	U.S. Geological Survey
WBNP	Wood Buffalo National Park

1.0 INTRODUCTION

Review of proposed maintenance and construction activities for the Oncor Electric Delivery Company, LLC (Oncor) by U.S. Fish and Wildlife Service (the Service) requested the prioritization of existing transmission lines for avian deterrent installations. Of specific concern was the potential risk for whooping crane (*Grus americana*) collision, provided its Federal status as an endangered species (35 FR 8491, June 1970) under the Endangered Species Act of 1973. Oncor contracted PBS&J to perform model development and prioritization for existing transmission lines within their Service Area, which extends across north-central Texas (Figure 1). Development of a prioritization model for this purpose necessitates an understanding of the life history and behavioral ecology of whooping cranes relative to transmission line locations and attributes of their surrounding habitats.

During spring and fall migration, a portion of the Aransas-Wood Buffalo (AWBP) whooping cranes' flyway intersects Oncor's Service Area. Population estimates as of March 2010 enumerate 263 whooping cranes (242 adult, 21 juvenile) in the AWBP (Stehn 2010), the only self-sustaining wild whooping crane population remaining (Canadian Wildlife Service [CWS] and the Service 2005, Service 2009). The AWBP overwinters on the Texas coast at Aransas National Wildlife Refuge (ANWR) and nearby areas but breeds more than 2,400 miles (3,816 kilometers) to the north, in the wetlands of Wood Buffalo National Park (WBNP) in Alberta and the Northwest Territories of northern Canada (CWS and the Service 2005; Service 2009). In completing the journey between wintering and breeding grounds twice annually, the migration corridor is essentially a straight line between these locations, with fall and spring routes along the same general flight path each year (Howe 1989, Kuyt 1992). States and provinces typically transected include Alberta, Saskatchewan, extreme eastern Montana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas, though the migration corridor can be over 200 miles (322 kilometers) wide and errant weather sometimes dislocates cranes to other states (Service 2009).

Federal and state efforts to record information on whooping cranes sighted in migration began in 1975 and have continued to the present day through the Cooperative Whooping Crane Tracking Project in the U.S. and Canada (Service 2009). Historic records dating as far back as 1943 were incorporated. With a period of record extending to the spring of 2009, the database includes 2,098 confirmed sightings made by biologists or persons skilled in avian identification. Figure 2 presents 61 confirmed sightings of migrating whooping cranes in Texas over a 29-year period (1977–2006).

The phenology of AWBP whooping crane migration is relatively well defined. Spring departure from ANWR usually begins between March 25 and April 15, and fall migration from WBNP typically initiates in mid-September (CWS and the Service 2005, Service 2009). Whooping cranes are in migration for approximately 3 months each year (CWS and the Service 2005, Service 2009). During this period they typically travel during daylight hours in groups of 1 to 5 birds (Johns 1992), using thermals and wind currents at high altitudes (1,000 to 6,000 feet [304.8 to 1,829 meters]) to travel extended distances (200 to 400 miles [322 to 644 kilometers] per day) with minimal effort (Service 2009). Inclement conditions,

such as shifting wind direction and the loss of thermal currents later in the day, demand excessive energy expenditure and cause whooping cranes to seek stopover habitat (Armbruster 1990, Service 2009). Migrating whooping cranes may also descend to lower elevations to travel short distances between roosts and forage sites and to forage and drink mid-day while in migration (Service 2009).

Whooping crane vulnerability to power line collision is greatest during these periods of low altitude flight in low visibility, which most frequently occur when entering and leaving roosting sites (Brown et al. 1987, Faanes 1987, CWS and the Service 2005, Lee 1978, Thompson 1978, Service 2009, Stehn 2007). Of recorded mortalities for fledged whooping cranes, 60 to 80 percent of deaths occur during migration (Lewis et al. 1992), and power line collisions are the most common cause, with the serious injury or death of 46 whooping cranes since 1956 attributed to this factor (Lewis et al. 1992, Stehn and Wassenich 2008). Deterrent techniques of marking power lines have been shown to reduce the risk of line strike by 50 to 80 percent (Brown and Drewien 1995, Morkill and Anderson 1991, Yee 2008). However, effective collision deterrence requires the identification of suitable stopover habitat proximal to or intersected by transmission lines in areas with high probability of migrating whooping crane occurrence.

Within the United States, traditional whooping crane stopover areas—used for extended periods each year during spring and fall migrations (Melvin and Temple 1981)—have not been identified (Johnson and Temple 1980). However, numerous historic sightings have occurred in some areas due to prominent features that attract cranes from extended distances, and these locations have been designated critical habitat (Armbruster 1990, CWS and the Service 2005). No critical habitat has been defined within Oncor’s Service Area. Nonetheless, nontraditional whooping crane stopover areas—suitable habitat used for roosting overnight or several days in inclement weather (Melvin and Temple 1981)—are present within the Service Area, as evidenced by confirmed historic sightings (see Figure 2).

Limited information is available regarding whooping crane selection of nontraditional stopover areas during migration (Armbruster 1990), and available data are further confounded by opportunistic site selection based on weather conditions and whooping crane location at the end of the day (Service 2009). Research suggests that whooping cranes use a variety of habitats during migration but primarily use shallow water palustrine, lacustrine, and riverine wetlands for roost sites (Howe 1987, 1989, Johns et al. 1997, Johnson and Temple 1980, Lingle 1986, Lingle et al. 1991). Wetland type selected has been shown to vary by social group (family versus nonfamily) (Howe 1987) and season (Howe 1987, Johnson and Temple 1980).

Wetland suitability as nontraditional stopover areas has been correlated with numerous factors. Whooping cranes appear to prefer sites devoid of dense vegetation and obstructions (Howe 1987, Johnson and Temple 1980, Ward and Anderson 1987). Armbruster (1990) and Faanes et al. (1992) purport the horizontal visibility threshold to objects greater than 3.28 feet (1 meter) in height is at least 65.6 feet (20 meters) over water distance for suitable nontraditional stopover areas. Conclusions vary regarding optimal water depth, but depths of less than 11.02 inches (28 centimeters) appear ideal (Howe 1987, Johnson and Temple 1980, Lingle et al. 1984, 1986, Walkinshwa 1973, Ward and Anderson 1987).The relationship

between wetland size and suitability is unresolved. Whereas Howe (1987, 1989) observed that 75 percent of roost wetlands were less than 9.88 acres (4 hectares) in size and over 50 percent were smaller than 1.24 acres (0.5 hectare) for nine radio-tagged whooping cranes, Johns et al. (1997) reported average roost sizes of 36 and 508 hectares (for spring and fall sites, respectively). Habitat suitability for nontraditional stopover areas may also be linked to large-scale spatial patterns in land cover (Richert and Church 2001; Richert et al. 1999), with areas characterized by wetland mosaics perhaps the most suitable (Johns et al. 1997, Stehn 2007). In riverine wetlands, whooping cranes prefer submerged sandbars in wide, unobstructed channels as narrow as 180 feet (55 meters) in width but predominantly greater than 509 feet (155 meters) (Faanes et al. 1992, Johnson 1981). Use of riverine wetlands is greatest in Nebraska (Armbruster 1990, Service 2009). Regardless of wetland type, a common behavior in whooping crane site selection is avoidance of human activity and disturbances (CWS and the Service 2005).

Given the opportunistic nature of whooping crane selection of nontraditional stopover areas coupled with the at times seemingly contradictory research on habitat suitability, development of a robust prioritization model must largely rely on assumptions deduced from prevailing trends and probability theory. Efforts are limited by data availability and must be based on metrics discernible at a broad, landscape scale while preserving accuracy. The sections that follow discuss an approach used to prioritize transmission line deterrent efforts for whooping cranes within the Oncor Service Area.

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2.0 METHODS

Prioritization of whooping crane transmission line deterrent efforts for Oncor was performed within a geographic information system (GIS) environment using ESRI ArcGIS Desktop Ver. 9.3. Model logic was based on the best available understanding of whooping crane migration and habitat preferences, as presented in scientific literature. The prioritization of transmission line segments was assessed according to location within the whooping crane migration corridor and proximity to potentially suitable stopover habitat. All analyses were performed remotely.

2.1 MODEL DEVELOPMENT

The model development logic used by PBS&J was adapted from whooping crane habitat prioritization efforts by Armbruster (1990), Stahlecker (1992), the Service (2009a), and others and implemented numerous spatial datasets. Transmission line locations (decimal degrees) were provided by the Applicant in tabular format and imported into ArcGIS as point features. Locations represented GPS positions either of structures recorded on the ground or flight track records logged at 5-second intervals. Sequential data points were generally separated by a distance of less than a half mile. Based on the Service whooping crane migration corridor spatial data (Service 2008), the area of interest was clipped to include only transmission lines within 90 miles of the migration centerline. This 180-mile (290-kilometer) corridor contains approximately 95 percent of all confirmed whooping crane sightings (excluding significant outliers and Texas panhandle sightings), and therefore represents at a broad-scale the area within which exists an elevated probability of whooping crane collisions with power lines.

Per “Region 6 Guidance for Minimizing Effects from Power Line Projects within the Whooping Crane Migration Corridor” (Service 2009b), the search radius for suitable stopover habitat was defined as a 1-mile (1.61-kilometer) distance from each transmission line data point within the clipped area. Previous efforts to remotely detect potentially suitable whooping crane stopover habitat have analyzed National Wetlands Inventory (NWI) spatial data (e.g., Stahlecker 1992). However, digital NWI data are unavailable for the entire extent of the area of interest and include only limited features. Therefore, the high-resolution National Hydrography Dataset (NHD) for Texas (U.S. Geological Survey [USGS] n.d.), which is the surface water component of *The National Map*, was queried to select all waterbodies within the 1-mile (1.61-kilometer) radius. The NHD is based on 1:24,000-scale topographic mapping and presents the geometric configuration of lake/pond, reservoir, swamp/marsh, stream/river, and other surficial hydrographic features (USGS n.d.).

Behavioral studies support avoidance of areas near development or prone to disturbances, such as noise pollution, vehicular traffic, and other human activities, by migrating cranes (Armbruster 1990, Armbruster and Farmer 1981). To account for this behavior, Armbruster (1990) suggests identifying a zone of influence around such permanent features, which then constitutes unsuitable habitat. Accordingly, zones of influence were identified within the area of interest for development, railroads, and paved and unpaved roads, as specified in Table 1.

Table 1.
Types of Disturbances and Size of Affected Area Assumed to Influence Migrating Whooping Crane
Stopover Site Selection

Type of Disturbance	Width of Affected Area (meters)	Data Source	Features
Development	400	NLCD, USGS, 2003a, 2003b, 2006	Developed: Low, Medium, and High Intensity*
Railroads	400	Railroads, Texas Department of Transportation (TXDOT) 1997	All
Paved Roads	400	Roads/highways, TXDOT n.d.	Road Type: City Street, County Road (Paved), Divided Subdivision Street, Frontage Road/Ramp, Highway Boulevard, Highway Rural, Highway in City, Rural Subdivision Boulevard, and Rural Subdivision Street
Unpaved Roads	200	Roads/highways, TXDOT n.d.	Road Type: County Road (All Weather), County Road (Earth), and Unclassified

*Low intensity impervious cover 20 to 49%, medium intensity impervious cover 50 to 79%, and high intensity impervious cover 80 to 100%.

For each NHD waterbody meeting the previously defined requirements, the intersecting area of influence from disturbance, and hence unsuitable habitat, was subtracted from the overall geometric area to calculate the potential area of suitable habitat for that feature. Nonriverine waterbodies with less than 0.04 hectare of potentially suitable habitat and river segments with channel widths less than 328.1 feet (100 meters) were subsequently removed from analysis due to their lower probability of providing suitable habitat (Austin and Richert 2001, Davis 2003) and to facilitate computation (Armbruster 1990). For each transmission line data point, the area of potentially suitable whooping crane stopover habitat was calculated as the summation of potentially suitable habitat for all screened NHD waterbodies within 1 mile (1.61 kilometer) of the respective data point. Riverine features were not included in the spatial summation of potentially suitable habitat given their nonenclosed, linear geometry and the quantification difficulties they present. However, these features were used to designate the presence of potentially suitable habitat within the search radius for transmission line data points.

2.2 PRIORITIZATION

The opportunistic nature of stopover habitat selection in whooping crane migration and the complexity of factors that influence this decision complicate predictive efforts in this regard. Nonetheless, logic follows that the probability of whooping crane collisions with power lines, and hence deterrent prioritization, should be greatest for power lines located near suitable habitat positioned along the flight path of migrating whooping cranes. According to this premise, the greatest risk of whooping crane collision with power lines should occur along the pathway over which travels the highest frequency of birds, under the assumption that suitable habitat is not rare on the landscape. Conversely, where suitable stopover habitat

is infrequent, the positive correlation between relative collision risk and habitat availability should increase.

Based on 1,858 confirmed sightings, the Service (n.d.) analyzed the frequency of whooping crane occurrence in relation to distance from the migration centerline (see Figure 2). An apparent trend is the substantial decrease in probability of occurrence with increased distance from the centerline. The probability of whooping crane occurrence within the area of interest was categorized as high, moderate, or low based on this dataset. Descriptions of these categories are provided in Table 2.

Table 2.
Categorical Ranking of Whooping Crane Stopover Probability Based on Distance from Migration Corridor Centerline and Percent of Confirmed Sightings

Probability of Stopover	Distance from Migration Corridor Centerline (miles)	Percent of Sightings
High	0–40	80.09
Moderate	40–65	9.95
Low	65–90	5.12

Confirmed occurrences of whooping cranes in Texas were not used to prioritize transmission line data points for deterrent efforts due to the limited data available and low probability of whooping cranes returning to previously used nontraditional stopover areas. During migration, each whooping crane makes approximately 7 to 9 stopovers in the U.S. (Kuyt 1992), which, based on current AWBP numbers, would result in approximately 1,419 stopovers annually (Service 2009). As such, the dataset captures a small percentage of actual stopover occurrences and hence is prone to bias.

To quantify the availability of potentially suitable habitat, power line data points were further classified by the integrated area of potentially suitable stopover habitat from screened NHD waterbodies within their respective 1-mile (1.61-kilometer) search radius. Classes were arbitrarily ranked by size in hectares, as follows: less than 1 hectare (2.471 acres), 1 to 10 hectares (2.471 to 24.71 acres), 10 to 100 hectares (24.71 to 247.1 acres), 100 to 1,000 hectares (247.1 to 2,471 acres), and greater than 1,000 hectares (2,471 acres). sed for a quotation...

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3.0 RESULTS

The following paragraphs describe the results of the model development and prioritization processes for migrating whooping crane transmission line deterrent efforts within Oncor's Service Area.

3.1 MODEL DEVELOPMENT

By clipping the transmission line data points to within 90 miles (144.8 kilometers) of the migration corridor centerline, selecting NHD waterbodies within a 1-mile (1.61-kilometer) radius, and adjusting waterbody size by disturbance area of influence, a large subset of waterbodies (26,797 features) with ≥ 0.04 hectare of potentially suitable habitat was identified. Area of potentially suitable habitat for these features ranged from 0.099 to 50,811 acres (0.04 to 20,563 hectares). However, frequency distribution by size was heavily skewed to the left, depicting an inverse J-shaped geometric distribution (Figure 3). Approximately 94 percent of screened waterbodies (25,174 features) exhibited less than 2.471 acre (1 hectare) of potentially suitable habitat.

Throughout the area of interest, potentially suitable stopover habitat was abundant within the 1-mile (1.61-kilometers) search radius of clipped transmission line data points: approximately 82 percent of data points (65,887 features) had proximal habitat. Furthermore, approximately 91 percent of these data points had two or more NHD waterbodies with ≥ 0.099 acre (≥ 0.04 hectare) of potentially suitable habitat within a 1-mile (1.61-kilometer) radius. Cumulative area of potential stopover habitat within 1 mile (1.61 kilometer) of transmission line data points was heavily skewed to the left with a defined minimum of 0.099 acre (0.04 hectare), a maximum of 50,843 acres (20,576 hectares), and a median of 7.26 acres (2.94 hectares) (Figure 4).

3.2 PRIORITIZATION

Based on model output, potentially suitable whooping crane stopover habitat is relatively abundant within 1 mile (1.61 kilometer) of transmission lines located less than or equal to 90 miles (144.8 kilometers) from the migration corridor centerline. Given the opportunistic nature of migrating whooping crane habitat selection, the probability of whooping crane stopover should be less strongly correlated with habitat suitability and more tightly coupled with the frequency at which whooping crane flight paths intersect some unknown buffer surrounding potentially suitable habitat within which cranes are able to identify and select stopover habitat. More so, the greatest potential risk of whooping crane collision with power lines should occur along the pathway over which travels the highest frequency of birds—the defined high stopover probability area within 40 miles (64.4 kilometers) of the migration centerline in which approximately 80.09 percent of confirmed sightings have occurred. Potential risk of collision should decrease greatly with distance from migration centerline, and from high to moderate to low stopover probability areas, respectively (e.g., Stehn 2007).

Substantial uncertainty confounds the relationship between wetland size and stopover habitat selection by migrating whooping cranes. Research supports preference for landscapes with a mosaic of wetland features. Intuitively, stopover probability within 1 mile (1.61 kilometer) of a given power line data point, and hence risk of whooping crane collision, should increase relative to the availability of potentially suitable habitat—albeit according to some unknown relationship. Thresholds undoubtedly exist within this relationship, and assumptions must be made regarding optimal cumulative potential habitat. Armbruster (1990) constructed a suitability index for nontraditional stopover habitats based on size in which wetlands linearly increase in suitability from 0.099 acre (0.04 hectares) to 2.471 acres (1.0 hectares), at which point optimum size requirements are met. Stahlecker (1992) observed few small, remotely sensed wetlands (<2.471 acres [<1 hectare]) were suitable as whooping crane roosts upon field inspection. Employing similar logic, it is unlikely that transmission line data points with cumulative potential habitat <2.471 acres (<1 hectare) represent areas of high whooping crane collision risk in the area of interest, whereas, transmission line data points with cumulative area of potential habitat ≥ 2.471 acres (1 hectare) should represent areas of higher risk.

Prioritization of transmission line deterrent efforts to avert migrating whooping crane collision using the model developed should be based on two parameters: the location of the transmission line in relation to the probability of flight path occurrence and the cumulative area of potentially suitable stopover habitat. Table 3 presents the model-derived prioritization logic based on the combination of these parameters and in accordance with the best available scientific information. Figure 5 depicts the spatial configuration of parameters, and in conjunction with Table 3, should be used to prioritize transmission line deterrent efforts.

Table 3.
 Prioritization Logic for Transmission Line Deterrent Efforts to Prevent Whooping Crane Collisions

Priority	Probability of Whooping Crane Flight Path Occurrence	Cumulative Area of Potential Habitat (hectares)
1st	High	>10,000
2nd		1,000 to 10,000
3rd		100 to 1,000
4th		10 to 100
5th		1 to 10
6th	Moderate	>10,000
7th		1,000 to 10,000
8th		100 to 1,000
9th		10 to 100
10th		1 to 10
11th	Low	>10,000
12th		1,000 to 10,000
13th		100 to 1,000
14th		10 to 100
15th		to 10 ha

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4.0 DISCUSSION

As previously mentioned, the relative abundance of potentially suitable stopover habitat within the area of interest, paired with the opportunistic nature of whooping crane selection of nontraditional stopover areas, increases the importance of the probability of whooping crane flight paths intersecting potential habitat. At a broad scale, the approach employed serves as a relatively robust prioritization method for determining high-risk areas for whooping crane-power line collision. Yet, results must be considered within the context of inherent limitations.

Undoubtedly, the determination of potentially suitable habitat is an overestimate. The inability to further reduce or eliminate potential habitat based on horizontal site visibility and water depth limits results in the classification of unsuitable habitat as suitable in some cases. Field verification would be required to determine actual habitat suitability. In Oklahoma, where conditions may be most similar with that of Texas, Stahlecker (1992)—using a similar but slightly more refined approach—found that map review was a poor predictor of suitability (33 percent correct) but a good predictor of unsuitability (97 percent correct) when ground truthed. Further, the identification of wetland features on the landscape is constrained by the lack of digital NWI data and dependent on the accuracy of NHD delineation of wetland features. However, at the broad scale, wetland features are typically spatially correlated on the landscape, and logically the potential for suitable whooping crane stopover habitat should increase with the area of wetlands, especially in landscapes characterized by a mosaic of these features as observed for Oncor’s Service Area. Therefore, it is reasonable to assume that the model approach used captures the relative abundance of potentially suitable habitat within a 1-mile (1.61-kilometer) search radius of transmission line data points, despite potential omissions of wetland features and overestimates of suitable habitat area. Weighting priority by distance from migration corridor centerline further reduces biases that may result given the limited available information on whooping crane selection of nontraditional stopover areas.

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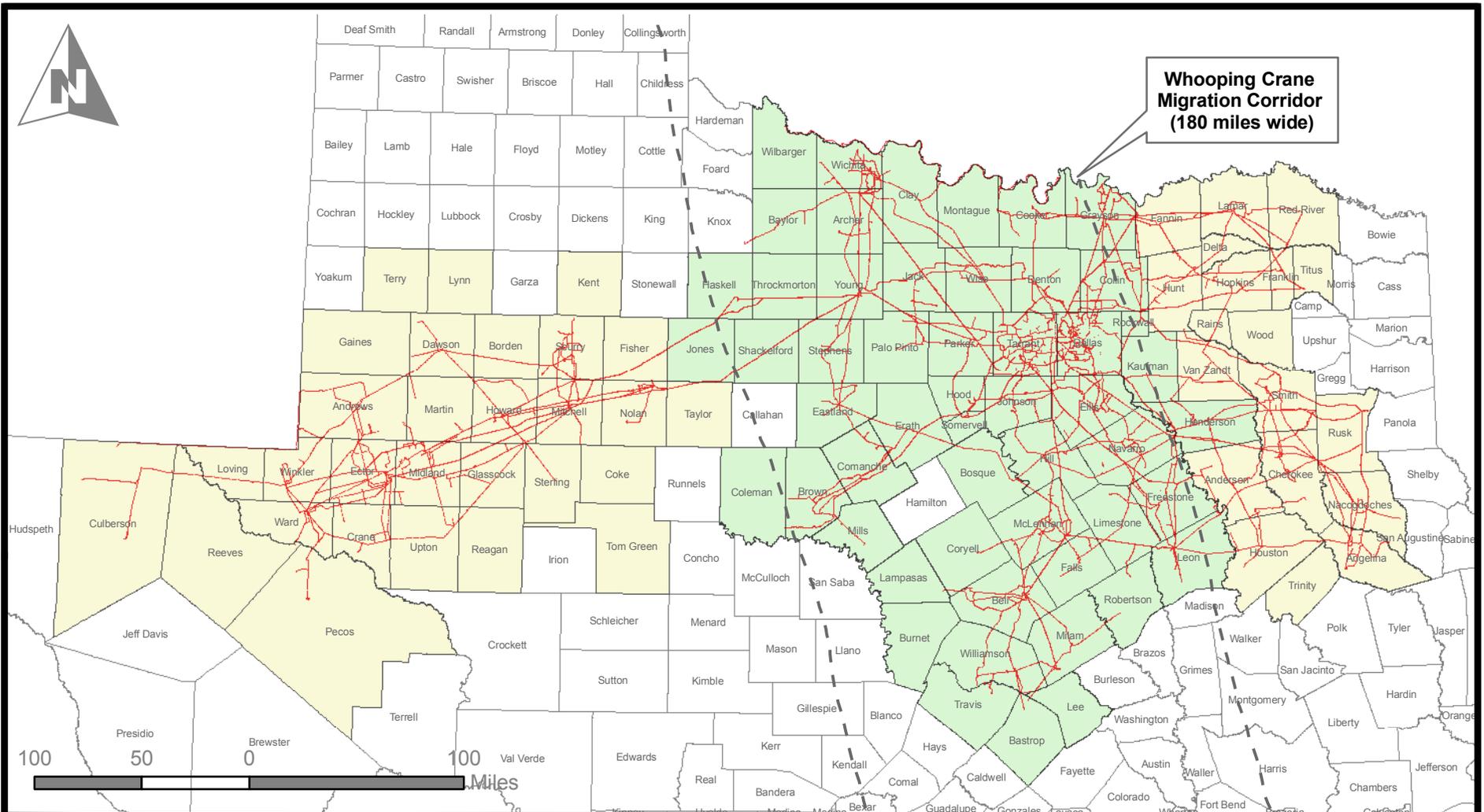
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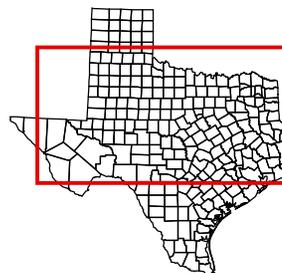
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Figures



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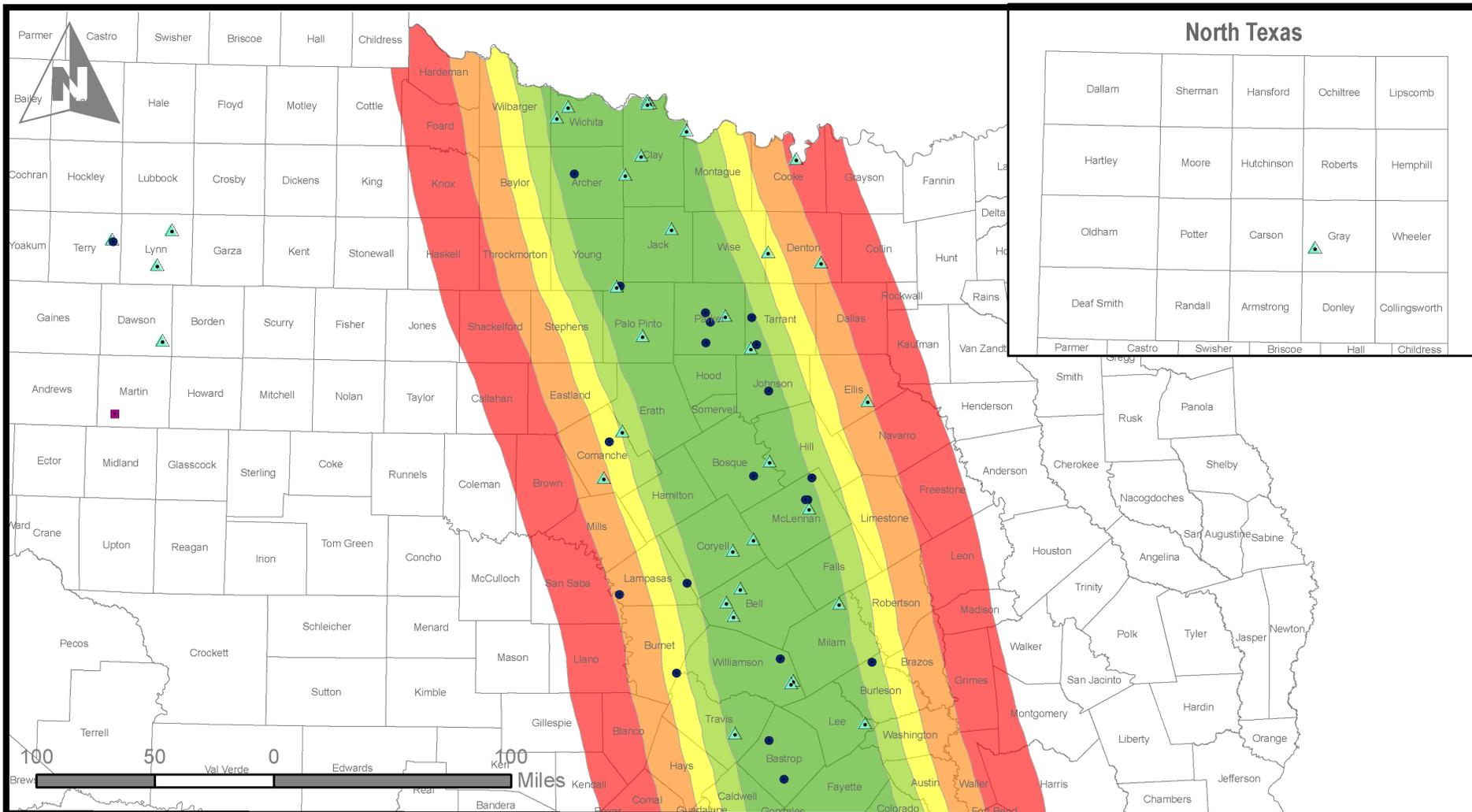
-  Transmission Lines
-  Service Area Counties in Migration Corridor
-  Oncor Service Area



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Figure 1 Oncor Service Area and Transmission Lines Respective to Whopping Crane Migration Corridor

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Prepared by: JW Williamson	Date: 2011 July 1
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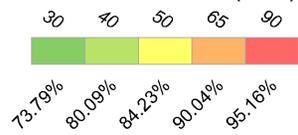
Texas Whooping Crane Sightings*

- Flying
- ▲ On Land or In Water
- On Land But Injured

*Confirmed sightings from 1977 to Spring 2009.

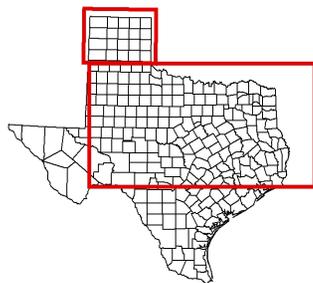
Migration Corridor

Distance from Centerline (miles)



Percent of All Whooping Crane Sightings Along Migration Corridor Within Distance

- 73.79%
- 80.09%
- 84.23%
- 90.04%
- 95.18%



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Figure 2 Whooping Crane Migration Corridor and Confirmed Sightings in Texas

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Prepared by: JW Williamson	Date: 2010 July 20
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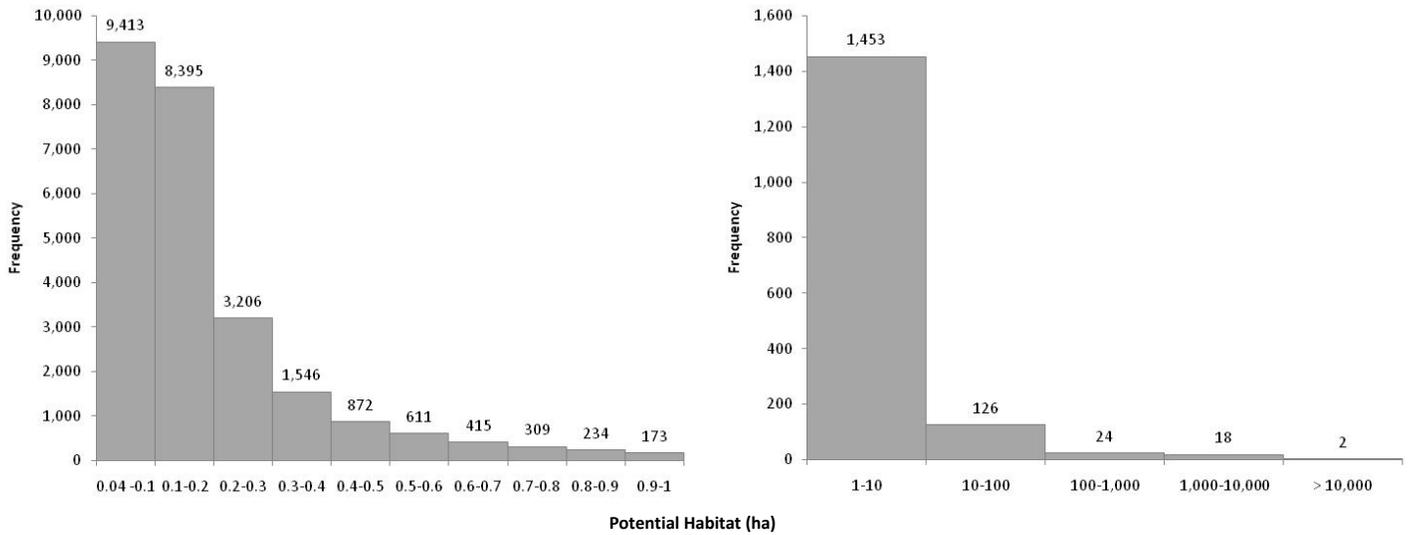


Figure 3. Frequency distribution by area of potential stopover habitat (hectares) for screened NHD waterbodies (n = 26,797) within one mile of transmission line data points located less than or equal to 90 miles from the migration corridor centerline.

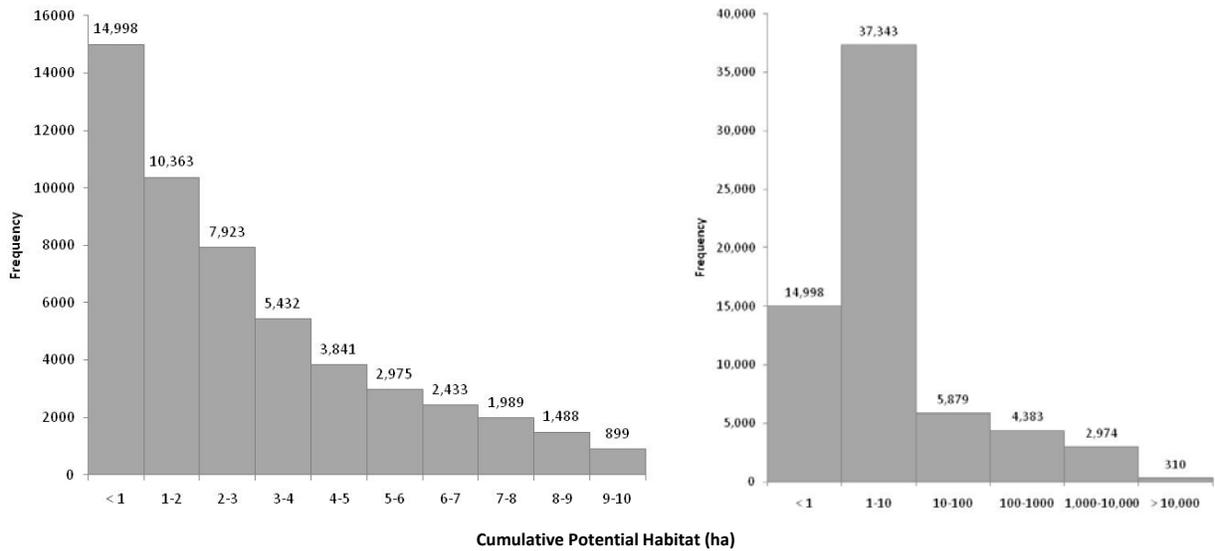


Figure 4. Frequency distribution by cumulative potential stopover habitat (hectare) within 1 mile for transmission line data points located less than or equal to 90 miles from the migration corridor centerline.

