FINAL

LCRA TRANSMISSION SERVICES CORPORATION TRANSMISSION SYSTEM HABITAT CONSERVATION PLAN

JULY 2019

PREPARED FOR

LCRA Transmission Services Corporation

PREPARED BY

SWCA Environmental Consultants

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Prepared for

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GLOSSARY

Term	Definition
°F	Abbreviation for degrees Fahrenheit
Activity Zones	Groups of Plan Area counties used to geographically apportion LCRA TSC Activities
Adjoining Activity Zone	Plan Area counties that are adjacent to Existing Facilities Activity Zones or Future Growth Activity Zones and are somewhat likely to receive New Construction
Advance Mitigation	Mitigation actions that occur prior to the start of the associated Covered Activity
Annual Report	A report of HCP activities provided to the USFWS annually by September 1; the report covers the period between July 1 and June 30 of the prior year
Applied Mitigation Ratio	Combined Mitigation Ratio for a Covered Species that incorporates all relevant Enrollment Scenarios and Mitigation Factors associated with a Covered Activity
Aquatic Species	Class of Covered Species that occur in surface and/or subsurface aquatic habitats; for standardizing the estimation of take
Assumed Occupied Karst Feature	A karst feature occurring in Suitable Habitat for one or more species of the Terrestrial Karst Invertebrate class of Covered Species where Presence/Absence Surveys have not been performed and occupancy of the karst feature by a one or more of these species has not been otherwise demonstrated. The limit of an Assumed Occupied Karst Feature is the area within 345 feet of the feature entrance or footprint (if known).
Assumed Occupied Spring Feature	A spring feature (i.e., a spring outlet or associated spring run or lake or well) in Suitable Habitat for one or more species of the Aquatic Species class of Covered Species where Presence/Absence Surveys have not been performed and occupancy of the spring feature by one or more of these species has not been otherwise demonstrated. The limit of an Assumed Occupied Spring Feature is the area within 984 feet of the spring outlet. Wells or other human-formed aquifer features are not assumed to be occupied by any of the Aquatic Species (i.e., a demonstration of occupancy is needed for wells and other human-formed aquifer features).
ATV	Abbreviation for all-terrain vehicle
Avoidance Measures	Voluntary conservation measures that reduce the amount of (or completely avoid) incidental take of a listed species
BCCP	Abbreviation for the Balcones Canyonlands Conservation Plan
CCN	Abbreviation for Certificate of Convenience and Necessity
CFR	Abbreviation for the U.S. Code of Federal Regulations
Changed Circumstances	Defined by regulations at 50 CFR §17.3 as “changes in circumstances affecting a species or geographic area covered by a conservation plan or agreement that can reasonably be anticipated by plan or agreement developers and the Service [USFWS] and that can be planned for (e.g., the listing of new species, or a fire or other natural catastrophic event in areas prone to such events)”
Conservation Credit	A measure of Mitigation in terms of the number of acres of conservation land that are involved a conservation action, or the equivalent thereof, as adjusted by the relative conservation value of the action
Conservation Program	The voluntary Avoidance Measures, the enrollment process, and the suite of minimization and Mitigation measures described in this HCP
Conservation Provider	A third-party that may be used to implement Mitigation on behalf of LCRA TSC
Conservation Provider Agreement	A legally binding agreement between LCRA TSC and a Conservation Provider that specifies the terms and conditions under which the Conservation Provider will provide the agreed upon Mitigation
Covered Activity(ies)	A specific instance of one or more LCRA TSC Activities performed within a specific geographic area during a specific time, and for which LCRA TSC desires to use the HCP and ITP to authorize incidental take of one or more Relevant Covered Species; together, all LCRA TSC Activities that become enrolled in the HCP
Covered Species	Collectively, the set of species for which LCRA TSC seeks incidental take authorization
Critical Habitat	As defined in Section 3(5)(A) of the ESA

Term	Definition
Direct Habitat Modification	Covered Activities that directly and contemporaneously modify Suitable or Occupied Habitat for a Covered Species within the relevant surface or subsurface footprint of Covered Activities; together with Indirect Habitat Modification, this metric approximates the amount or extent of incidental take
Disturbance	An alteration of land or other habitat characteristic that may involve alterations above the surface (i.e., alteration of vegetation) or alterations at or below the surface (i.e., alterations of the soil or underlying bedrock; subsurface)
E&S	Abbreviation for erosion and sedimentation
Emergency Responses	Class of LCRA TSC Activities comprising activities similar in nature to New Construction, Upgrading and Decommissioning, and Operations and Maintenance that are needed to ensure that human health and safety and property are protected and that essential utility services are quickly restored when disrupted
Enrollment Scenario	Circumstances associated with a Covered Activity that determine the appropriate series of Mitigation Ratios for Mitigation based on the assessment of incidental take using Suitable Habitat or Occupied Habitat, or the applicability of Special Cases; the amount of Mitigation needed for a Covered Activity depends on the Enrollment Scenario (or combination thereof) associated with the Covered Activity
EPA	Abbreviation for the U.S. Environmental Protection Agency
ERCOT	Abbreviation for the Electric Reliability Council of Texas
ESA	Abbreviation for the federal Endangered Species Act
Existing Facilities Activity Zone	Plan Area counties that contained Facilities at the time of HCP preparation (circa 2017) and where LCRA TSC is likely to perform LCRA TSC Activities
Existing Impacts	Land uses present at the time a Covered Activity is evaluated under this HCP that decrease the suitability or quality of Suitable or Occupied Habitat for a Covered Species; generally, applies to any land use or prior disturbance that USFWS typically considers as generating an indirect impact on habitat for a Covered Species
Facilities	The structures and lands that LCRA TSC either owns or on which it has rights to construct and maintain through easements or other means
Four Utilities HCP	Abbreviation for the HCP held by Aqua Water Supply Corporation, Bluebonnet Electric Cooperative, Inc., Austin Energy, and LCRA
Future Growth Activity Zone	Plan Area counties where future electrical load growth is likely to occur in the next 5 to 10 years and where LCRA TSC is likely to perform New Construction
General Minimization Measures	Adjustments to the conduct of Covered Activities that generally minimize the impacts of the Covered Activities on Covered Species and other environmental resources; LCRA TSC applies General Minimization Measures to all Covered Activities, as applicable to the circumstances
Habitat Surrogate	Means of estimating and tracking incidental take of individuals of the Covered Species using the acres of Suitable Habitat or Occupied Habitat that is directly or indirectly modified by Covered Activities as a surrogate for the number of individuals actually taken
HCP	Abbreviation for a Habitat Conservation Plan
HCP Contingency Funding	Funds available from LCRA TSC for implementing Mitigation related to Emergency Responses, implementing Changed Circumstances, and addressing other contingencies during the ITP Term
HCP Handbook	Abbreviation for the *Habitat Conservation Planning and Incidental Take Permit Processing Handbook* (USFWS and NMFS 2016)
Indirect Habitat Modification	Covered Activities that cause the alteration of Suitable or Occupied Habitat for a Covered Species beyond the relevant surface or subsurface physical footprint of Covered Activities; together with Direct Habitat Modification, this metric approximates the amount or extent of incidental take
ITP	Abbreviation for Incidental Take Permit
ITP Term	The duration of the requested ITP; 30 years from the date of ITP issuance
kV	Abbreviation for kilovolts
LCRA	Abbreviation for Lower Colorado River Authority; an affiliate of LCRA TSC

Term	Definition
LCRA Transmission Services Corporation Transmission System Habitat Conservation Plan	Full title of the Habitat Conservation Plan
LCRA TSC	Abbreviation for the LCRA Transmission Services Corporation
LCRA TSC Activities	LCRA TSC actions performed within the Plan Area during the ITP Term that, under certain circumstances, are likely to cause incidental take of one or more Covered Species
Long-term Cost Multiplier	In the absence of actual quotes, the means for estimating the costs of long-term adaptive management, monitoring, reporting, coordination, and contingencies for conservation lands supporting Mitigation under this HCP
Mitigation	Conservation actions that offset the impacts of authorized incidental take associated with Covered Activities, as described in Chapter 6.5 of this HCP
Mitigation Factors	Circumstances associated with a Covered Activity that involve one or more of the following: Existing Impacts, Relaxed Restrictions, and Post-Enrollment Mitigation. The amount of Mitigation needed for a Covered Activity depends, in part, on whether one or more of the Mitigation Factors applies to the Covered Activity
Mitigation Ratio	The number of Conservation Credits needed to offset each acre of Direct or Indirect Habitat Modification
No Surprises	Regulatory assurances to ITP permittees provided by USFWS rule (63 FR 8859, codified at 50 CFR §17.22, §17.32, §222.2)
NEPA	Abbreviation for the National Environmental Policy Act
New Construction	Class of LCRA TSC Activities that create a new Facility or Facilities
NHPA	Abbreviation for the National Historic Preservation Act
NLCD	Abbreviation for the National Land Cover Database
NMFS	Abbreviation for the National Marine Fisheries Service
Occupied Habitat	Those portions of Suitable Habitat for a Covered Species where regular use by that Covered Species has been demonstrated by a Presence/Absence Survey or has been previously documented; occupancy may be seasonal
Occupied Karst Feature	A karst feature occurring in Suitable Habitat for one or more of the species of the Terrestrial Karst Invertebrate class of Covered Species that is known to be occupied by one or more of these species. The limit of an Occupied Karst Feature is the area within 345 feet of the feature entrance or footprint (if known).
Occupied Spring Feature	A spring feature (i.e., a spring outlet or associated spring run or lake or well) occurring in Suitable Habitat for one or more of the species of the Aquatic Species class of Covered Species that is known to be occupied by one or more of these species. The limit of an Occupied Spring Feature is the area within 984 feet of the spring feature.
Operations and Maintenance	Class of LCRA TSC Activities related to the operation and maintenance of Facilities
Other Counties Activity Zone	Plan Area counties that are not included in another Activity Zone
Outside ERCOT Activity Zone	Plan Area counties that are outside of ERCOT and where LCRA TSC is unlikely to perform LCRA TSC Activities
PADUS	Abbreviation for Protected Areas Database of the United States
Plan Area	The geographic area where LCRA TSC Activities and the Conservation Program may occur, and where incidental take of the Covered Species caused by Covered Activities would be authorized by the ITP
Post-Enrollment Mitigation	A Changed Circumstance when on-the-ground Mitigation actions for a particular Relevant Covered Species occur after the corresponding Covered Activity has begun. Associated with a Mitigation Factor that increases the amount of Mitigation assessed for the Covered Activity for each year that completion of the Mitigation lags the specific instance of incidental take. Expected to be a rare occurrence that provides essential operational flexibility consistent with the Operational Goals and Objectives.

Term	Definition
Presence/Absence Survey	Survey for a Covered Species to determine if Suitable Habitat is Occupied or Unoccupied Habitat
PUC	Abbreviation for the Public Utility Commission of Texas
PUC Environmental Assessment	Environmental assessment submitted by a utility provider as part of the PUC process, not an environmental review document prepared under NEPA
PURA	Abbreviation for the Public Utility Regulatory Act
Relaxed Restrictions	A Mitigation Factor that increases the Standard Mitigation Ratio when LCRA TSC cannot practicably implement one or more of the Specific Minimization Measures for a Relevant Covered Species during a Covered Activity. Expected to be a rare occurrence that provides essential operational flexibility consistent with the Operational Goals and Objectives.
Relevant Covered Species	A Covered Species for which LCRA TSC indicates that coverage under this HCP and the associated ITP is desired for a particular Covered Activity
ROW	Abbreviation for Rights-of-Way and includes all lands associated with Facilities, including lands associated with linear corridors and site-based support Facilities (such as switching stations and substations)
Special Cases	Circumstances where a Covered Activity is likely to have significantly greater impact on a Covered Species than other enrollment scenarios; greater levels of Mitigation apply when Covered Activities involve Special Circumstances
Species of Concern	Species occurring within the Plan Area that are currently listed as threatened or endangered; are proposed, candidates, or petitioned for future listing; are identified on current USFWS listing work plans; or are listed by the State of Texas as threatened or endangered
Specific Minimization Measures	Adjustments to the conduct of Covered Activities that minimize the impacts of take on specific Covered Species; greater levels of Mitigation apply when LCRA TSC does not implement Specific Minimization Measures for a Covered Activity (see Relaxed Restrictions)
Standard Mitigation Ratios	The base amount of Mitigation needed for a Covered Activity; varies with Enrollment Scenario
Structures	The physical structures comprising LCRA TSC's transmission lines, site-based support facilities, and access roads
Suitable Habitat	Areas that possess the elements of habitat for a Covered Species and that are delineated by a site-specific habitat assessment; for purposes of this HCP, occupancy by the Covered Species is assumed (assumed occupancy may be seasonal) unless Suitable Habitat is determined through a Presence/Absence Survey to be Unoccupied Habitat
Surrogate Rule	USFWS regulation at 50 CFR §402.14 that allows in ESA Section 7 consultations the use of surrogate measures for quantifying the amount and extent of take where certain criteria have been met
SWCA	Abbreviation for SWCA Environmental Consultants
Take Likelihood Factor	A coarse metric to adjust the output of the conceptual model for estimating take
TCEQ	Abbreviation for the Texas Commission on Environmental Quality
TCOS	Abbreviation for Transmission Cost of Service, a term related to rate recovery cases before the PUC
Terrestrial Karst Invertebrates	Class of Covered Species that occur in subterranean caves and mesocavernous spaces; for standardizing the estimation of take
TPWD	Abbreviation for the Texas Parks and Wildlife Department
TWDB	Abbreviation for the Texas Water Development Board
UAV	Abbreviation for unmanned aerial vehicles
Unforeseen Circumstances	Unforeseen Circumstances are changes in circumstances affecting a species or geographic area covered by an HCP that could not reasonably have been anticipated by the ITP applicant and the USFWS at the time of the HCP's development, and that result in a substantial and adverse change in the status of any Covered Species (50 CFR §17.3).
Unoccupied Habitat	Those portions of Suitable Habitat for a Covered Species where a Presence/Absence Survey did not demonstrate regular use by that Covered Species and no other records of occupancy appear in USFWS files as provided to LCRA TSC

Term	Definition
Upgrading and Decommissioning	Class of LCRA TSC Activities associated with upgrading an existing Facility or decommissioning an existing Facility
USC	Abbreviation for the United States Code
USFWS	Abbreviation for the U.S. Fish and Wildlife Service
USGS	Abbreviation for the U.S. Geological Survey

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CHAPTER 1. INTRODUCTION AND BACKGROUND

LCRA Transmission Services Corporation (LCRA TSC) is a nonprofit corporation conducting electric transmission operations within Texas. LCRA TSC currently owns or operates approximately 5,200 miles of electric transmission lines and nearly 400 electric substations across the state. LCRA TSC's transmission lines and substations help provide reliable electric transmission service to Texas power generators and are an integral part of the overall power system for residential, business, commercial, and industrial power customers across Texas. As with other electric transmission systems in Texas, the Public Utility Commission of Texas (PUC) regulates the activities of LCRA TSC, and LCRA TSC coordinates its operations with the Electric Reliability Council of Texas (ERCOT). ERCOT manages the power grid that serves most of the state. LCRA TSC monitors the projected growth in demand for electricity and works with its transmission customers and regulatory agencies to ensure that its Facilities.[1] including new transmission lines and new substations, meet federal and state requirements for providing reliable electric transmission service.

LCRA TSC prepared this Habitat Conservation Plan (HCP) in accordance with Endangered Species Act (ESA) Section 10(a)(2)(A−B) to support an application for an Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (USFWS) pursuant to Section 10(a)(1)(B) of the ESA. The Plan Area for this HCP is the 221-county ERCOT region in Texas, plus any Texas county bordering the ERCOT region. Consequently, the Plan Area includes 241 of the 254 counties in Texas (Figure 1). This HCP addresses LCRA TSC Activities that involve the construction, operation, upgrade, decommissioning, repair and maintenance of electrical transmission lines, substations, access roads, and related infrastructure and facilities within the Plan Area (LCRA TSC Activities). Some LCRA TSC Activities may affect species listed as threatened or endangered under the ESA or species that the USFWS may list as threatened or endangered in the future. This HCP describes a programmatic approach over a 30-year period from the date of ITP issuance (ITP Term) for achieving ESA compliance for 23 species that occur in the Plan Area (Covered Species) related to certain LCRA TSC Activities that LCRA TSC enrolls in the HCP (Covered Activities). As of the date of this HCP, the USFWS lists 22 of the Covered Species as threatened or endangered.

LCRA TSC and the Lower Colorado River Authority (LCRA), which created LCRA TSC,[2] have proven experience as reliable partners for natural resources conservation. LCRA owns nearly 11,000 acres of parkland in the lower Colorado River basin, has a program for partnering with landowners and local agencies to implement conservation practices to reduce soil erosion and protect water resources (the LCRA Creekside Conservation Program), and created the Colorado River Land Trust to help preserve land and water quality in the Colorado River basin (LCRA 2018a). LCRA is also a managing partner in the Balcones Canyonlands Conservation Plan (BCCP) and a co-permittee in the Four Utilities HCP. LCRA TSC has worked with the USFWS to conserve listed species in association with projects like its Competitive Renewable Energy Zone transmission lines. This forward-looking HCP continues LCRA TSC's tradition of conservation partnership.

[1] Capitalized terms used in this HCP are defined in the Glossary.

[2] LCRA created LCRA TSC as a nonprofit corporation for transmission operations. On January 1, 2002, it transferred to LCRA TSC ownership of its transmission facilities to satisfy a 1999 Texas state law. LCRA TSC has no employees, but contracts with LCRA staff to operate and maintain the facilities and provide other services (LCRA 2018b).

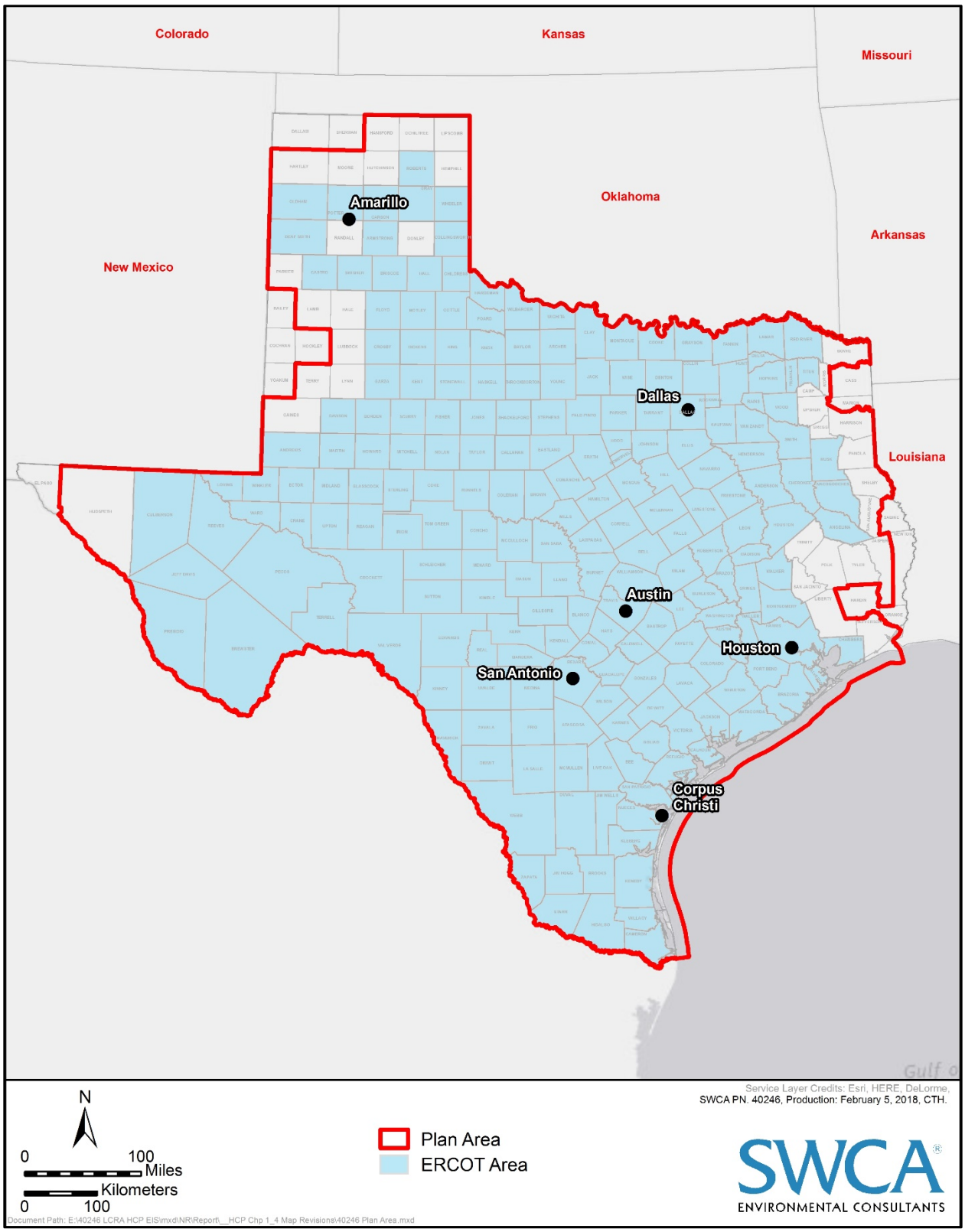

Figure 1. Location of the Plan Area.

1.1 ENDANGERED SPECIES ACT

Section 9 of the ESA prohibits take of species of fish or wildlife that are listed as endangered (16 United States Code [USC] §1538(a)). The USFWS extended this take prohibition to most threatened fish or wildlife species by regulation (50 Code of Federal Regulations [CFR] §17.31).[3] Take is defined in Section 3 of the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC §1532(19)). Harm is defined by USFWS regulation as an "an act which actually kills or injures wildlife. Such act 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). The USFWS defines the term harass 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" (50 CFR §17.3).

The USFWS issued a guidance memorandum to its Regional Directors on April 26, 2018, further clarifying the regulatory definitions of harm and harass (USFWS 2018). In this guidance memorandum, the USFWS clarified that harass is a term that applies to "intentional or negligent actions" and that actions that cause take via harass are not incidental. USFWS (2018) also clarified that harm can include habitat modification only if all three components of the regulatory definition of this term are met, as illustrated by this three-part test:

1. Is the modification of habitat significant?

2. If so, does that modification also significantly impair an essential behavior pattern of a listed species?

3. And, is the significant modification of the habitat, with a significant impairment of an essential behavior pattern, likely to result in the actual killing or injury of wildlife?

Under Section 10(a)(2)(B) of the ESA, the USFWS is required to issue an ITP where the applicant has met certain statutory issuance criteria. Specifically, the USFWS must issue an ITP when it finds, after an opportunity for public comment, that an application and conservation plan (commonly referred to as an HCP) demonstrate that:

1. the taking will be incidental;
2. the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking;
3. the applicant will ensure that adequate funding for the HCP will be provided;
4. the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild;
5. the applicant will ensure that other measures that the USFWS may require as being necessary or appropriate will be provided; and
6. the USFWS has received such other assurances as may be required that the HCP will be implemented (16 USC §1539(a)(2)(B)).

[3] The ESA does not prohibit take of listed plant species. Rather, with respect to listed plants, Section 9(a)(2) of the ESA prohibits, among other things: removing and reducing to possession any such species from areas under federal jurisdiction; maliciously damaging or destroying any such species on any such area; or removing, cutting, digging up, damaging, or destroying any such species from any other area in knowing violation of state law or in the course of any violation of state criminal trespass law (16 USC §1538(a)).

Regulations promulgated by the USFWS require that, in addition to the criteria above, an applicant must include in its HCP "procedures to deal with unforeseen circumstances" (50 CFR §17.22(b)(2)(i)(C)). ESA implementing regulations also give ITP permittees regulatory assurances under the No Surprises rule that provide certainty as to their future obligations under an ITP (50 CFR §17.22, §17.32, §222.2).

The *Habitat Conservation Planning and Incidental Take Permit Processing Handbook* (HCP Handbook) (USFWS and National Marine Fisheries Service [NMFS] 2016) provides guidance to ITP applicants and the USFWS regarding the preparation of HCPs and the process for obtaining an ITP.[4] The USFWS acknowledges that seeking an ITP is a voluntary action by an applicant (USFWS and NMFS 2016:3-2) and that "ultimately, landowners or project proponents need to assess whether take is reasonably certain to occur as a result of their activities to inform their decision whether to seek incidental take coverage" (USFWS and NMFS 2016:3-3).

Section 7(a)(2) of the ESA requires that federal agencies ensure that actions that the agencies authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species in the wild or result in the destruction or adverse modification of "Critical Habitat" (16 USC §1536(a)(2)). Where an agency action "may affect" one or more listed species or may destroy or adversely modify habitat designated as critical under ESA Section 4, the action agency consults with the USFWS to ensure that jeopardy to the relevant species or destruction or adverse modification of any designated critical habitat is not likely to occur. "Jeopardize the continued existence of" is defined by regulation as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, number, or distribution of that species" (50 CFR §402.02). In 2016, the USFWS published a Final Rule revising the regulatory definition of "destruction or adverse modification of critical habitat" to mean "a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (USFWS 2016a).

USFWS considers its issuance of an ITP a federal action to which the consultation requirement of ESA Section 7(a)(2) applies (USFWS and NMFS 2016). With respect to the issuance of ITPs, the USFWS functions as both the "action" agency and the "resource" agency, such that the USFWS consults with itself concerning the effects of its issuance of the ITP. According to the HCP Handbook, the consultation must include, among other things, an assessment of the impacts and likelihood of jeopardy and any adverse modification of critical habitat for all listed species (USFWS and NMFS 2016). To assist the USFWS with its Section 7 consultation, this HCP reviews whether the proposed issuance of the ITP is likely to jeopardize the continued existence of listed species and other species covered by the ITP or is likely to result in the destruction or adverse modification of any designated critical habitat. The USFWS and NMFS encourage ITP applicants to provide such information in an HCP (USFWS and NMFS 2016:7–5 and 7–17).

[4] The guidance provided in the HCP Handbook (USFWS and NMFS 2016) is based in part on policies of the U.S. Department of Interior and the USFWS that have been withdrawn. On July 30, 2018, the USFWS withdrew its agency-wide Mitigation Policy and the more focused Endangered Species Act Compensatory Mitigation Policy, stating that "…it is no longer appropriate to retain the 'net conservation gain' standard throughout various Service-related activities and is inconsistent with current Executive branch policy" (83 Federal Register 36472; 83 Federal Register 36469). The notices of withdrawal also state that all policies or guidance that were superseded by the now-withdrawn policies are reinstated (83 Federal Register 36472; 83 Federal Register 36469). The December 21, 2016, HCP Handbook was intended, in part to ensure consistency with "the most recent policies, such as the revised [US]FWS Mitigation Policy, which was announced via a Federal Register notice on November 21, 2016" (81 Federal Register 93703). Therefore, guidance in the HCP Handbook related to or arising from the withdrawn policies of the USFWS is subject to reconsideration in light of the now-reinstated prior policies.

1.2 NATIONAL ENVIRONMENTAL POLICY ACT

The USFWS considers its issuance of an ITP a federal action subject to compliance with the National Environmental Policy Act (NEPA) (42 USC §4321-4327; (USFWS and NMFS 2016:1–10). NEPA requires federal agencies to describe "1) the environmental impact of the proposed action; 2) any adverse environmental effects which cannot be avoided should the proposal be implemented; 3) alternatives to the proposed action; 4) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and 5) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented" (42 USC §4332(c)). Council on Environmental Quality regulations implementing NEPA require all federal agencies to analyze the effects of their proposed actions and to include other agencies and the public in the process (40 CFR §1500-1508).

The HCP Handbook explains that, to properly determine the scope of impacts that must be considered in a NEPA analysis, one must first define the proposed federal action (USFWS and NMFS 2016:13–3). In the context of an ITP, the federal action is the proposed issuance of an ITP based on the implementation of conservation measures set forth in the HCP (USFWS and NMFS 2016:13–3). As described in the HCP Handbook, the USFWS's "ability to exercise discretion over an ESA permit applicant's non-Federal activities is limited to ensuring the non-Federal entity's permit application meets the statutory and regulatory criteria in section 10(a)(2)(B) of the ESA and 50 CFR 17.22(b)(1) and 17.32(b)(1)" (USFWS and NMFS 2016). According to the HCP Handbook, which cites to NEPA implementing regulations, the USFWS will identify the following for possible analysis: 1) the direct effects caused by the federal action at the immediate time and place (40 CFR §1508.8); 2) the indirect effects caused by the federal action later in time, or at a distance, that are reasonably foreseeable (40 CFR §1508.8); and 3) the cumulative effects due to the incremental impact of the federal action when added to past, present, and reasonably foreseeable future actions (whether federal or non-federal) (USFWS and NMFS 2016; 40 CFR §1508.7).

NEPA compliance is a federal agency obligation, and the USFWS is responsible for preparing the environmental review document and coordinating with other agencies and the public. The USFWS aims to employ the lowest level of environmental review that meets the requirements of NEPA for the issuance of ITPs (USFWS and NMFS 2016). To help it determine what level of NEPA review was appropriate for the proposed issuance of an ITP to LCRA TSC, the USFWS published a Notice of Intent to Prepare a Draft National Environmental Policy Act Analysis and Associated Documents in the Federal Register (FR) on July 31, 2017 (82 FR 35539). The publication opened a 30-day comment period to allow the public to view project information, ask questions, and submit comments regarding the scope of the issues and alternatives for the USFWS to consider as part of its environmental review that must be completed pursuant to the NEPA before any ITP decision is made. The USFWS, with LCRA TSC, held four public open house meetings during August 2017 in Austin, Midland, Corpus Christi, and College Station to present information about the process for ITP issuance and related NEPA review and to collect additional comments from the public. During the public notice and comment period held between July 31, 2017 and August 30, 2017, the USFWS received two comment letters, which are included as an appendix to the USFWS's NEPA document(s) prepared in connection with the ITP.

1.3 NATIONAL HISTORIC PRESERVATION ACT

The National Historic Preservation Act (NHPA) requires, among other things, that federal agencies consider the effects of their undertakings on cultural resources that are included, or may be eligible for inclusion, on the National Register of Historic Places (54 USC §100101, et seq.). Advisory Council on Historic Preservation regulations define an undertaking as a "project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out

by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval" (36 CFR §800.16(y)). As set forth in the HCP Handbook, USFWS considers its issuance of an ITP and implementation of the HCP as "undertaking[s] and subject to compliance with section 106 of the NHPA" (USFWS and NMFS 2016:1−10). Appendix A to the HCP Handbook contains the preferred approach of USFWS in complying with the NHPA for project-specific (as opposed to programmatic) ITPs. Like NEPA, it is the obligation of the federal action agency to comply with the provisions of the NHPA. In recognition of this fact, USFWS began gathering information concerning cultural resources during the NEPA public scoping process described in Chapter 1.2 above. USFWS also reached out to federally recognized tribes and invited participation of those tribes in the NHPA review process. Detailed information concerning NHPA compliance in connection with this HCP and associated ITP may be found in Appendix A to this HCP and will also be addressed in the USFWS's NEPA document(s).

1.4 PUBLIC UTILITY COMMISSION OF TEXAS

The PUC regulates the construction of electric transmission lines in Texas under the Public Utility Regulatory Act (PURA; codified in Title II of the Texas Utilities Code) and the Texas Administrative Code, Title 16, Part II, Chapter 25. Construction of new electric transmission lines in Texas by LCRA TSC or most other electrical utility providers must first be approved by the PUC. The PUC typically grants such approval only if need for the line is demonstrated adequately and if routing for the line was conducted in accordance with PUC Substantive Rules (16 Texas Administrative Code §25.101) and factors outlined in PURA. The PUC controls which entities can provide transmission utility service through the issuance of amendments to certificates of convenience and necessity (CCNs). A utility wanting to build a transmission line first applies to the PUC for an amendment to its existing CCN. Typically, an application to amend a CCN must describe the proposed transmission line, the need for the line, estimated costs, and the impact that building the line would have on the environment and the affected community.

Prior to applying for a CCN amendment, a utility provider seeking to build a transmission line between two points typically conducts a routing analysis that compares several alternate routes that the line could travel to connect those points. The comparative routing analysis includes an environmental assessment of a Study Area identified for purposes of this analysis. Routes are formulated considering criteria outlined in Texas Utilities Code §37.056(c), 16 Texas Administrative Code §25.101(B), and a variety of environmental and land use constraints. Specifically, these rules prescribe that electric transmission lines be routed to the extent reasonable in a manner that moderates the impact on the affected community and landowners, unless grid reliability and security dictate otherwise. Some of the routing factors considered under the 16 Texas Administrative Code chapter 25, Texas Utilities Code §37.056(c), and the PUC's interpretation of those statutory provisions and rules are:

- whether the routes use existing compatible rights-of-way, including the use of vacant positions on existing multiple-circuit transmission lines;
- whether the routes parallel existing compatible rights-of-way;
- whether the routes parallel property lines or other natural or cultural features;
- whether the routes conform with the policy of prudent avoidance;
- the number of habitable structures in proximity to the line;
- the engineering constraints on constructing the line; and
- the cost to construct the line.

The utility provider then submits its environmental assessment (a PUC Environmental Assessment, not to be confused with an environmental review document prepared under NEPA) and routing analysis to the PUC as part of its CCN application package, along with identification of a route the utility provider believes best addresses the routing criteria and factors included in PURA and the PUC's rules. As described by Texas Utilities Code §37.056(c), the PUC then decides whether to approve the application for a CCN amendment based on the submitted information, input from the State Office of Administrative Hearings, landowners, and other members of the public that intervene in the proceeding.

1.5 OTHER POTENTIALLY RELEVANT LAWS AND REGULATIONS

LCRA TSC will comply with all other applicable federal, state, and local laws pertaining to its activities. Compliance with other applicable federal laws, such as Section 404 of the Clean Water Act administered by the U.S. Army Corps of Engineers, may trigger the need for additional interagency consultation under Section 7(a)(2) of the ESA between the federal action agency and the USFWS. However, issuance of the ITP will substantially streamline the federal agency's obligations for interagency consultation related to Covered Activities, because effects to listed species and designated critical habitats will already have been evaluated and addressed in this HCP and the USFWS's related Biological Opinion and NEPA environmental review document (see, for example, streamlining language in General Condition 18 of the U.S. Army Corps of Engineers 2017 Nationwide Permit Program). As long as the terms and conditions of the ITP are fully implemented, additional voluntary conservation measures or mandatory reasonable and prudent measures for the Covered Species should not be necessary to meet the regulatory obligations of Section 7(a)(2) of the ESA. Other federal regulations that may be relevant to certain LCRA TSC Activities include the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, both administered by the USFWS.

CHAPTER 2. PLAN AREA

2.1 LOCATION AND EXTENT

The Plan Area covers nearly 163 million acres or approximately 95% of the state (see Figure 1). Table 1 lists the 241 Texas counties included in the Plan Area. The Plan Area is the area in which LCRA TSC conducts LCRA TSC Activities. The Plan Area also captures the area where incidental take authorized by the ITP will occur and where the conservation measures specified in this HCP will occur.

Table 1. Texas Counties within the Plan Area

County Name	Acres	County Name	Acres	County Name	Acres
Anderson	691,601	Glasscock	577,730	Moore	582,669
Andrews	962,667	Goliad	550,148	Morris	165,412
Angelina	555,590	Gonzales	684,504	Motley	633,263
Aransas	180,612	Gray	596,549	Nacogdoches	630,503
Archer	592,797	Grayson	627,050	Navarro	696,204
Armstrong	583,821	Gregg	176,243	Nolan	584,398
Atascosa	779,108	Grimes	513,859	Nueces	549,192
Austin	420,571	Guadalupe	456,885	Ochiltree	588,479
Bandera	510,044	Hale	643,616	Oldham	962,872
Bastrop	572,535	Hall	577,635	Palo Pinto	630,119
Baylor	575,825	Hamilton	534,768	Panola	527,544
Bee	563,117	Hansford	589,642	Parker	580,635
Bell	695,422	Hardeman	452,228	Parmer	567,562
Bexar	803,897	Harris	1,121,415	Pecos	3,055,355
Blanco	457,063	Harrison	588,424	Polk	713,030
Borden	580,100	Hartley	937,665	Potter	590,188
Bosque	641,211	Haskell	582,329	Presidio	2,481,837
Bowie	592,848	Hays	433,248	Rains	165,514
Brazoria	915,086	Hemphill	583,950	Randall	590,341
Brazos	377,821	Henderson	607,687	Reagan	752,413
Brewster	3,977,397	Hidalgo	1,014,219	Real	447,837
Briscoe	578,328	Hill	630,503	Red River	678,581
Brooks	603,428	Hood	281,866	Reeves	1,698,386
Brown	611,914	Hopkins	508,628	Refugio	497,867
Burleson	433,763	Houston	793,692	Roberts	590,707
Burnet	652,095	Howard	578,885	Robertson	554,105
Caldwell	350,499	Hudspeth	2,947,920	Rockwall	95,219
Calhoun	347,865	Hunt	565,024	Runnels	674,645
Callahan	575,898	Hutchinson	573,099	Rusk	602,837
Cameron	650,885	Irion	672,641	San Augustine	380,771

County Name	Acres	County Name	Acres	County Name	Acres
Camp	130,553	Jack	588,747	San Jacinto	403,499
Carson	591,584	Jackson	544,333	San Patricio	451,641
Castro	577,076	Jasper	623,128	San Saba	727,599
Chambers	406,538	Jeff Davis	1,456,666	Schleicher	837,089
Cherokee	681,366	Jefferson	615,850	Scurry	580,642
Childress	457,678	Jim Hogg	726,593	Shackelford	585,447
Clay	713,929	Jim Wells	555,579	Shelby	536,488
Coke	594,633	Johnson	469,713	Smith	609,327
Coleman	820,967	Jones	599,229	Somervell	122,088
Collin	566,947	Karnes	482,076	Starr	784,401
Collingsworth	587,269	Kaufman	516,745	Stephens	589,332
Colorado	623,519	Kendall	423,822	Sterling	590,843
Comal	368,048	Kenedy	1,058,272	Stonewall	587,691
Comanche	609,319	Kent	576,293	Sutton	932,138
Concho	634,150	Kerr	708,065	Swisher	577,576
Cooke	576,704	Kimble	799,537	Tarrant	575,102
Coryell	676,172	King	584,295	Taylor	588,033
Cottle	576,038	Kinney	872,123	Terrell	1,511,395
Crane	505,815	Kleberg	578,470	Terry	570,778
Crockett	1,795,786	Knox	547,347	Throckmorton	585,590
Crosby	576,789	La Salle	960,943	Titus	273,886
Culberson	2,457,603	Lamar	598,712	Tom Green	986,666
Dallas	581,615	Lamb	652,549	Travis	656,348
Dawson	578,000	Lampasas	456,489	Trinity	457,396
De Witt	582,540	Lavaca	621,995	Tyler	601,164
Deaf Smith	960,546	Lee	405,805	Upshur	380,597
Delta	178,123	Leon	692,206	Upton	793,962
Denton	612,512	Liberty	754,175	Uvalde	999,795
Dickens	580,289	Limestone	597,389	Val Verde	2,070,958
Dimmit	847,236	Lipscomb	597,308	Van Zandt	551,301
Donley	596,900	Live Oak	690,452	Victoria	569,176
Duval	1,148,952	Llano	617,971	Walker	513,213
Eastland	594,577	Loving	434,222	Waller	331,974
Ector	579,228	Lubbock	577,543	Ward	536,932
Edwards	1,358,901	Lynn	571,673	Washington	397,655
Ellis	608,840	Madison	303,181	Webb	2,157,894
Erath	695,036	Martin	586,560	Wharton	701,000
Falls	494,860	Mason	596,856	Wheeler	584,529
Fannin	576,673	Matagorda	730,122	Wichita	405,942

County Name	Acres	County Name	Acres	County Name	Acres
Fayette	614,498	Maverick	826,667	Wilbarger	626,585
Fisher	577,026	McCulloch	687,256	Willacy	424,313
Floyd	635,377	McLennan	679,624	Williamson	726,876
Foard	451,849	McMullen	741,865	Wilson	516,561
Fort Bend	567,798	Medina	856,973	Winkler	539,117
Franklin	188,991	Menard	577,319	Wise	590,636
Freestone	571,746	Midland	577,721	Wood	445,843
Frio	722,441	Milam	654,431	Young	595,236
Gaines	963,810	Mills	479,423	Zapata	676,687
Galveston	256,642	Mitchell	586,599	Zavala	828,467
Garza	574,604	Montague	601,825		
Gillespie	678,707	Montgomery	690,841	**TOTAL Plan Area**	**162,832,131**

2.2 ECOREGIONS

Ecoregions are areas with similar biotic, abiotic, terrestrial, and aquatic ecosystem components. The Plan Area includes portions of 12 national-scale (Level III) ecoregions, as defined by Griffith et al. (2007). Table 2 summarizes the key characteristics of each ecoregion and Figure 2 shows the distribution of ecoregions across the Plan Area.

Table 2. Ecoregions in the Plan Area

Level III Ecoregion Name	Geographic Representation (% of Plan Area)	Key Characteristics
Chihuahuan Deserts	14%	This desert ecoregion of West Texas contains alternating patterns of mountains, valleys, desert flats, bolson drainages, plateaus, and sand hills. The geology of this ecoregion is composed of faulted limestone reefs and volcanic rocks. The Rio Grande and Pecos River cross the ecoregion, but most precipitation either evaporates or recharges local aquifers. Vegetation is mostly semi-desert grassland and arid shrubland communities, with isolated woodlands of oak, juniper, and pinyon pine at the higher elevations. Historic grazing pressure has promoted the expansion of desert shrubland communities and the loss of grasslands (Griffith et al. 2007).
Edwards Plateau	11%	The Edwards Plateau ecoregion occurs in central Texas on a limestone plateau that is heavily faulted and dissected by stream corridors on its eastern edge. The underlying geology is karstic and contains many caves and voids that recharge local aquifers. Soils are generally shallow and rocky, and vegetation is typically juniper-oak or mesquite-oak savanna, subject to grazing by livestock. Closed canopy juniper-oak woodlands are more common to the east, trees to the west are smaller and shrubbier (Griffith et al. 2007).
High Plains	11%	The High Plains ecoregion occurs across the western half of the Texas Panhandle. The ecoregion sits at a relatively high elevation and has a smooth to slightly irregular topography. The climate is dry, receiving less than 20 inches of precipitation in an average year. Seasonal playa lakes are important sources of water and wildlife habitat in this area. Native vegetation communities to this ecoregion include shortgrass prairie and shinnery oak, but mesquite shrublands are also common. The region includes deep sands, as well as heavy, black earth soils. Crop production, livestock grazing, and oil and gas production are common across the ecoregion (Griffith et al. 2007; Johnson 2010; Texas Parks and Wildlife Department [TPWD] 2017).

Level III Ecoregion Name	Geographic Representation (% of Plan Area)	Key Characteristics
Southwestern Tablelands	9%	This sub-humid to semi-arid ecoregion of the eastern Texas Panhandle contains red-hued canyons, mesas, badlands, and dissected river breaks. Shortgrass or midgrass prairies and oak shinneries or juniper scrub communities are typical for the ecoregion. A portion of the Canadian River and the headwaters of the Colorado, Brazos, Concho, Wichita, and Red Rivers occur in this ecoregion. Riparian woodlands along these major river systems contain willow, cottonwood, elm, and hackberry. The rough terrain found in this ecoregion has discouraged extensive use for cropland or urban development, but grazing and oil and gas production are common (Griffith et al. 2007; TPWD 2012).
Western Gulf Coastal Plain	9%	This coastal ecoregion is a relatively flat strip of land adjacent to the Gulf of Mexico and includes barrier islands, peninsulas, bays, lagoons, marshes, and estuaries. Natural vegetation in this ecoregion grades from coastal grasslands to mostly forest or savanna communities inland. Much of the former coastal grasslands are currently cropland. Urban development, including the Houston metropolitan area, along the coast and oil and gas production are common (Griffith et al. 2007).
Cross Timbers	8%	The Cross Timbers ecoregion is a transitional area between western prairies and eastern forested hills, having a combination of irregular plains and low hills and tablelands. Vegetation communities in this ecoregion form a mosaic of forest, woodland, savanna, and prairie. Post oak and blackjack oak are common and natural grasslands were dominated by mid- and tallgrasses, such as little bluestem. Most of the ecoregion today is rangeland and pastureland, with abundance oil and gas production. This ecoregion contains the Dallas-Fort Worth metropolitan area (Griffith et al. 2007).
East Central Texas Plains	8%	The East Central Texas Plains ecoregion, also called the Post Oak Savanna or Claypan Area, has broad irregular plains with a mosaic of post oak savanna and tall- to midgrass prairie. Some portions of the ecoregion contain pine forest, and deciduous bottomland forest occurs along major river drainages. Ridges are sandy and well drained, while valleys tend to have clay soils that affects how water moves across the ecoregion. Cropland and grazing are common (Griffith et al. 2007).
South Central Plains	8%	This ecoregion in the northeast corner of Texas is also known as the Piney Woods. Irregular plains with low, rolling hills are blanketed in southern coniferous forests that grow on acidic sandy soils. Deciduous bottomland forests occur along major rivers, where flooded sloughs and swamps provide aquatic and wetland habitat. Forestry and oil and gas production are common (Griffith et al. 2007).
Southern Texas Plains	8%	Brush and thornscrub on rolling hills, dissected by the occasional stream corridor, typify the Southern Texas Plains of south-central Texas. Formerly grassland and savanna, thorny brush (such as mesquite) now dominate the landscape of this ecoregion in response to grazing and fire suppression. The climate is subhumid to dry.
Central Great Plains	7%	The Central Great Plains ecoregion occurs across a portion of north-central Texas, east of the High Plains and the Southwestern Tablelands. Exposed Permian-era sedimentary rocks color the rivers that cross this ecoregion with red sediment. With somewhat more precipitation than other plains ecosystems in Texas, the Central Great Plains once supported mixed or transitional prairie communities between the tallgrass systems to the east and the shortgrass systems to the west. Today, most of the ecoregion is cropland and grazed rangeland, but oil and gas production is also common. Mesquite and lotebush brush have also replaced some grasslands (Griffith et al. 2007; TPWD 2012).
Texas Blackland Prairies	7%	This discontinuous ecoregion occurs in the central part of Texas. The Texas Blackland Prairies are typified by fine-textured, clayey soils and predominantly tallgrass prairie natural vegetation. However, most of the natural prairie is now cropland or in urban or industrial use. Riparian forests occur along major rivers, whereas the southern unit of the ecoregion exhibits more of a mosaic of grassland and post oak woodland (Griffith et al. 2007).
Arizona / New Mexico Mountains	>1%	Only a very small portion of this rugged, mountainous ecoregion extends into West Texas from neighboring New Mexico. In Texas, this ecoregion captures the Guadalupe Mountains, including Guadalupe Peak, the highest point in Texas. Most of this ecoregion in Texas is within the Guadalupe Mountains National Park. Vegetation in this ecoregion is typical of the warmer and drier environments found in the southwestern United States, with lower elevation chaparral and mid-elevation pinyon-juniper and oak woodlands common in the Texas portion of the ecoregion (Griffith et al. 2007).

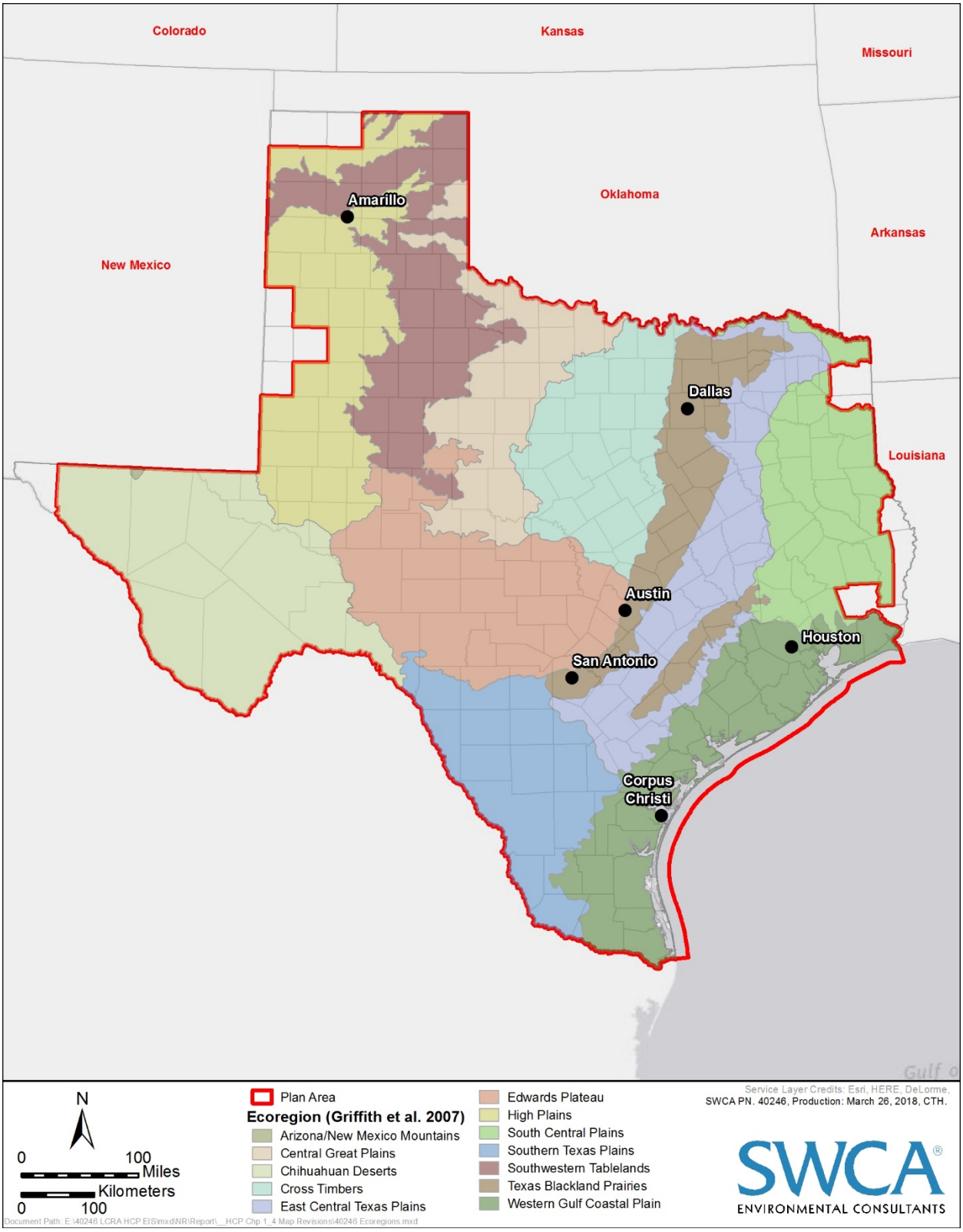

Figure 2. Ecoregions of Texas.

2.3 CLIMATE

Texas is a large state, spanning over 800 miles from north to south and from east to west, with a climate that varies from sub-tropical to semi-arid. The Texas climate is affected by seasonal air masses (such as artic fronts), subtropical west winds from the Pacific Ocean and Mexico, tropical cyclones and hurricanes from the Gulf of Mexico, a high pressure system from the Atlantic Ocean, and the movement of the jet streams (Texas Water Development Board [TWDB] 2012). Figure 3 shows the variation in the average annual temperature and precipitation across Texas.

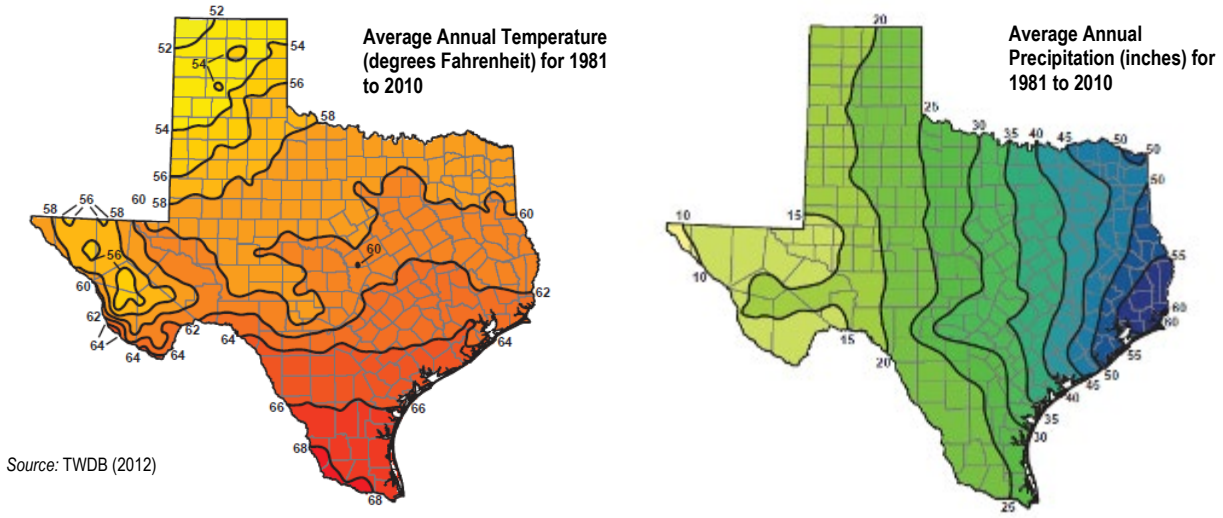

Figure 3. Average annual temperature and precipitation across Texas.

Texas is subject to periods of drought that vary in duration and intensity. The most severe drought of record in Texas, ranking highest in both duration and intensity, occurred during the 1950s (TWDB 2012). However, the period of severe drought between 2010 and 2014 ranks as the second worst and second-longest drought on record in Texas, with drought conditions in 2011 ranking as the most severe 1-year drought on record (TWDB 2017). Data from tree rings suggests that there have been at least 15 seven-year periods in Texas since the mid-1600s where precipitation was less than 90% of average (TWDB 2012).

The TWDB (2012) reports, based on information from Nielsen-Gammon (2011), projected temperature trends for Texas suggesting an increase in the average annual temperature of approximately 1 degree Fahrenheit (°F) between 2000 and 2019, approximately 2°F between 2020 and 2039, and approximately 4°F between 2040 and 2059, relative to a simulated average annual temperature for 1980 to 1999. TWDB (2012) notes that precipitation trends during the twentieth century have not always been consistent with climate model projections, and that there is "considerable disagreement among models whether there will be an increase or a decrease in precipitation prior to the middle of the 21st century." Nevertheless, climate models predict an overall global pattern of declining precipitation toward the middle of the twenty-first century (TWDB 2012).

Climate change assessments by the U.S. Environmental Protection Agency (EPA) also document recent and project future changes to the Texas climate (EPA 2016). EPA (2016) indicates that most of the state has warmed between 0.5°F to 1°F during the past century, with greater temperature rises in the western part of the state, compared to the eastern part. EPA (2016) also notes that the average annual rainfall totals are increasing across the eastern part of Texas, yet the soil moisture levels are becoming drier on average as temperatures rise and rainfall events decrease in frequency. The EPA also predicts rising sea levels along the Texas Gulf Coast, notes an increase in the intensity of tropical storms and hurricanes over the last 20 years, and suggests that inland flooding may occur more frequently as storms become heavier (EPA 2016). Finally, EPA (2016) notes that drought is likely to increase in frequency and severity—possibly increasing the severity, frequency, and extent of wildfires across the state and affecting the distribution of certain vegetation communities (such as changing some forests to grasslands or deserts).

2.4 GEOLOGY, ELEVATION, AND TOPOGRAPHY

The composition and structure of the rock underlying Texas influences climate, soils, vegetation, water availability, and wildlife habitats across the state. Texas geologic formations range in age from 600 million years old to recent alluvial deposits. The oldest formations, exposed in the Trans-Pecos and Llano Uplift regions of Texas, are deformed ancient volcanic and intrusive igneous rods and sedimentary rocks created early in the history of the Earth. Broad inland seas spurred the creation of sedimentary rocks, mostly limestones and shales, and evaporative processes created layers of salt, gypsum, and other deposits. Continental movements lifted mountains and ripped apart faults. Streams and rivers deposit gravel and sand, creating alluvial deposits (Bureau of Economic Geology 1992). Figure 4 shows the outcropping geologic formations across Texas.

Topography also varies across the state. Elevation above sea level decreases from west to east, with the highest point in Texas (Guadalupe Peak) reaching 8,719 feet above mean sea level. The roughest terrain in Texas occurs in the western part of the state, whereas the coastal plains are generally flat or rolling. Figure 5 shows the range of elevations and topography of Texas.

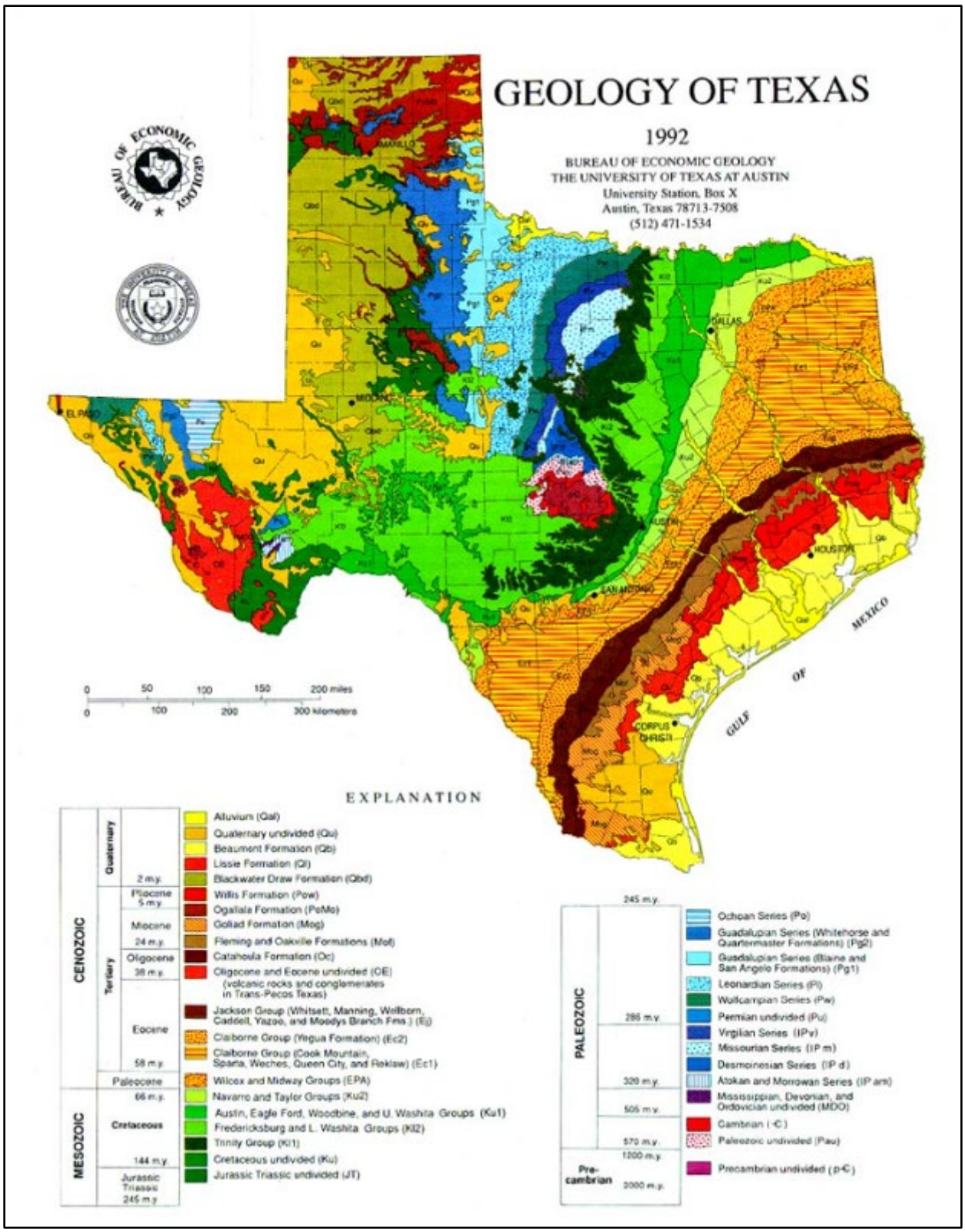

Figure 4. Geology of Texas.

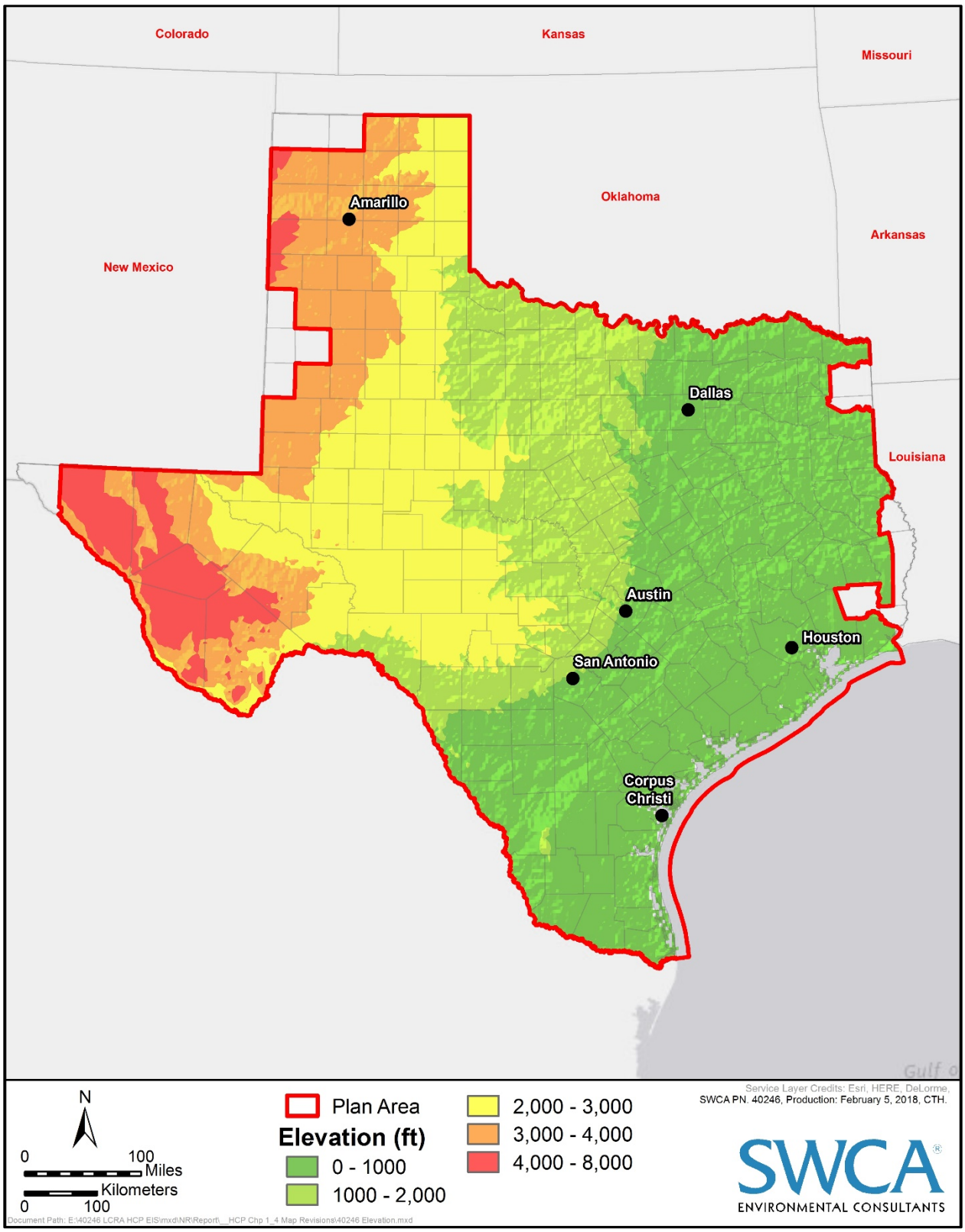

Figure 5. Elevation and topography across Texas

2.5 LAND USE AND LAND COVER

Land use and land cover can influence the distribution of plants and animals within the Plan Area. The 2011 National Land Cover Database (NLCD) provides a standardized, nationwide classification of land use and land cover types based on remote sensing data at a spatial resolution of 30 meters (Homer et al. 2015). Table 3 summarizes the extent of each land use or land cover type in the Plan Area and Figure 6 shows the distribution of land use and land cover types in the Plan Area.

Table 3. Land Use and Land Cover in Texas

NLCD Cover Type	Description*	Geographic Representation (% of Plan Area)
Open Water	Water with <25% vegetation or soil cover	>1%
Developed, Open Space	Mix of structures and developed vegetation (lawns, golf courses etc.), <20% impervious surfaces	1%
Developed, Low intensity	Mix of structures and developed vegetation with 20%–49% impervious surfaces	4%
Developed, Medium Intensity	Mix of structures and developed vegetation with 50%–79% impervious surfaces	2%
Developed, High Intensity	Mix of structures and developed vegetation with 80%–100% impervious surfaces	>1%
Barren Land (Rock/Sand/Clay)	Earthen material with <15% vegetative cover	>1%
Deciduous Forest	>20% cover by trees of 5 meters or taller, >75% of trees lose leaves simultaneously with seasonal change	>1%
Evergreen Forest	>20% cover by trees of 5 meters or taller, >75% of trees maintain leaves all year	4%
Mixed Forest	>20% cover by trees of 5 meters or taller, neither evergreen or deciduous trees >75% of tree cover	5%
Shrub/Scrub	>20% of vegetation is shrubs and/or small trees less than 5 meters tall	1%
Grassland/Herbaceous	>80% of vegetation graminoids or herbaceous	40%
Pasture/Hay	>20% of vegetation planted grass and/or legumes	18%
Cultivated Crops	>20% of vegetation cultivated crops	9%
Woody Wetlands	>20% of vegetation forest or shrubland, periodically saturated or covered by water	11%
Emergent Herbaceous Wetlands	>80% of vegetation perennial herbaceous, periodically saturated or covered by water	3%
None	No land cover type was assigned to this land	>1%

* *Source*: Homer et al. (2015)

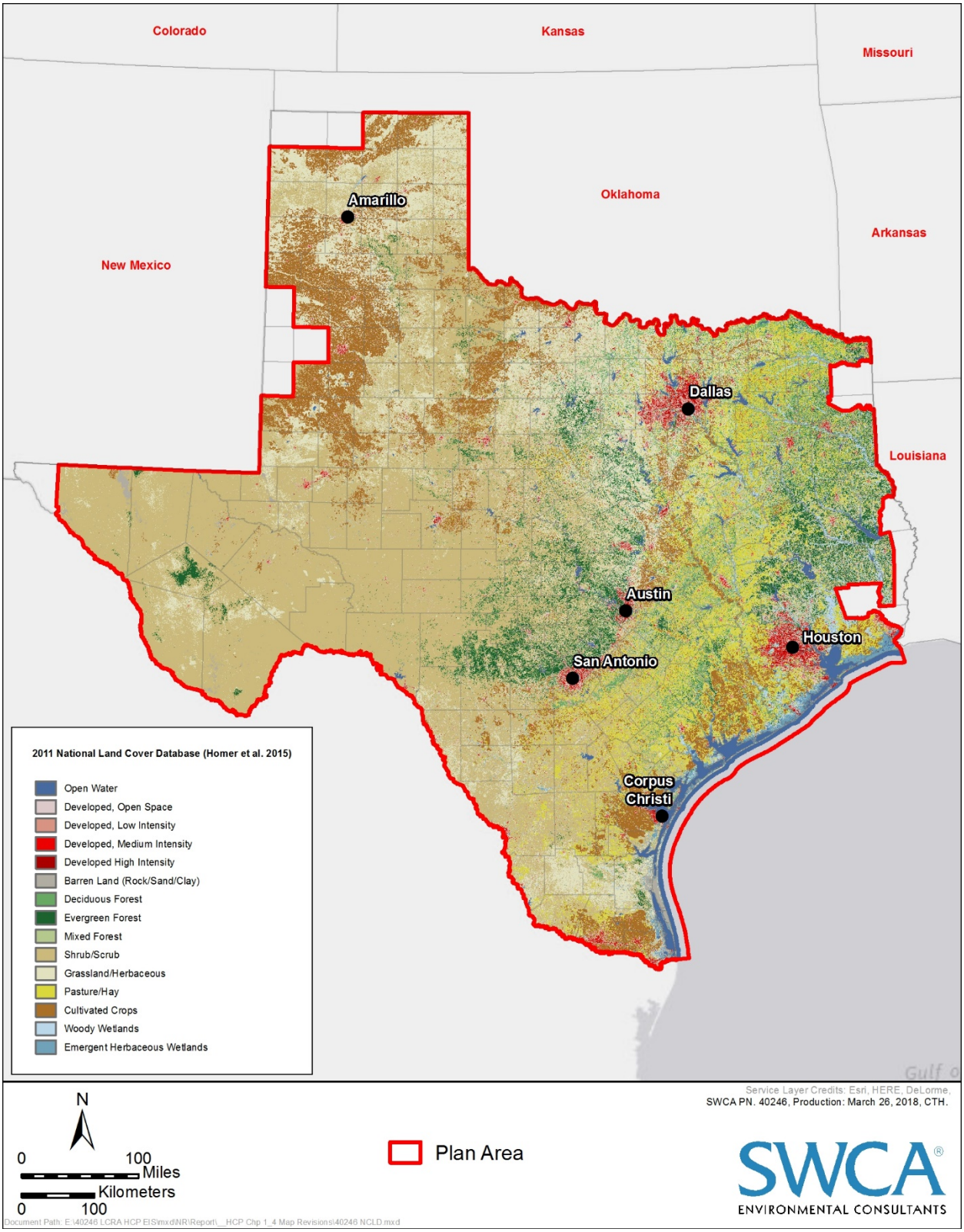

Figure 6. Land use and land cover in the Plan Area.

2.6 WATER RESOURCES

2.6.1 Surface Waters and Wetlands

The elevation gradient across Texas (see Figure 5) dips to the east towards the Gulf of Mexico. Therefore, the major river systems in Texas also generally flow south and eastward to the Gulf Coast. Texas has 22 major river or coastal basins (Figure 7). These basins contain many surface waters, including perennial rivers and streams, intermittent or ephemeral streams, natural or human-made impoundments and other open waters, and wetlands. Table 4 summarizes the surface waters contained in the Plan Area in each basin, excluding offshore waters.

Table 4. Surface Waters in the Plan Area

Major River or Coastal Basin	Perennial Rivers and Streams (miles)*	Intermittent or Ephemeral Streams (miles)*	Impoundments and Other Non-coastal Open Waters (acres)†	Wetlands (acres)‡
Brazos River Basin	4,564	71,765	745,266	231,152
Canadian River Basin	753	18,280	108,425	81,847
Colorado River Basin	2,009	56,023	456,497	115,413
Cypress River Basin	1,621	3,511	62,212	65,959
Guadalupe River Basin	944	14,285	108,292	121,678
Lavaca River Basin	446	3,477	43,073	20,492
Neches River Basin	5,753	16,977	166,776	336,197
Nueces River Basin	784	32,457	151,906	22,974
Red River Basin	2,601	43,011	410,828	233,156
Rio Grande River Basin	584	88,325	106,935	21,923
Sabine River Basin	2,897	12,980	244,862	215,624
San Antonio River Basin	537	7,814	49,357	16,505
San Jacinto River Basin	1,242	4,437	110,914	144,093
Sulphur River Basin	656	7,281	88,283	163,734
Trinity River Basin	5,504	34,700	906,181	444,241
Brazos-Colorado Coastal Basin	649	1,273	35,150	121,422
Colorado-Lavaca Coastal Basin	264	454	19,577	39,649
Lavaca-Guadalupe Coastal Basin	278	511	27,425	60,837
Neches-Trinity Coastal Basin	522	408	74,101	337,045
Nueces-Rio Grande Coastal Basin	186	3,187	149,534	234,309
San Jacinto-Brazos Coastal Basin	287	511	47,052	91,565
Trinity-San Jacinto Coastal Basin	59	46	5,727	15,158

Source: U.S. Geological Survey (2013) and USFWS (2016b)

* National Hydrography Dataset Flowline Feature Class; Stream/River Type; Perennial, Intermittent, or Ephemeral Codes

† National Hydrography Dataset Waterbody Feature Class; Lake/Pond, Playa, or Reservoir Types

‡ National Wetland Inventory, Estuarine and Marine Wetland, Freshwater Emergent Wetland, and Freshwater Forested/Shrub Wetland Types

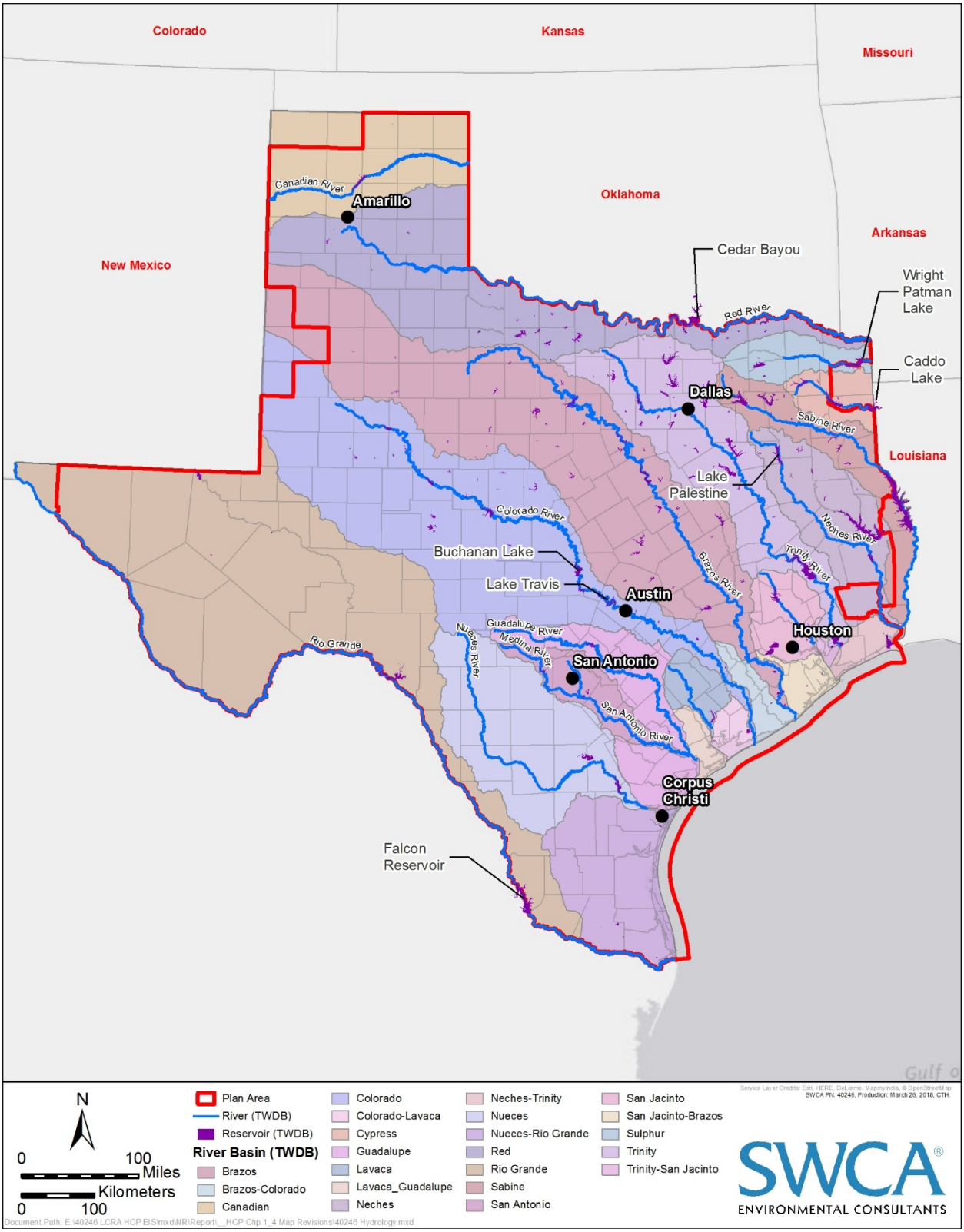

Figure 7. River and coastal basins and major surface waters in Texas.

2.6.2 Aquifers and Springs

Some rainfall in Texas moves underground through karst features, pores and spaces in soil, sediment, and rock and recharges groundwater stores. Groundwater stored and transported in the microscopic spaces between grains or within larger fractures or caves within rock or sediments form aquifers. Aquifers generally have zones where spaces are open to the surface and allow for surface water to recharge the aquifer, whereas other zones are closed to the surface and confine the groundwater to specific discharge points at wells or springs. Nine major aquifers and several other minor aquifers (Figure 8) and major springs that naturally discharge groundwater occur in the central and western portions of the state (see Figure 8) (Bureau of Economic Geology 2004).

2.7 PUBLIC OPEN SPACE LAND OWNERSHIP

Most lands in Texas are under private ownership, with a relatively small proportion of the state in public or tribal ownership. Federal entities own approximately 3.3% of the Plan Area, mostly under the administration of the National Park Service or the USFWS (U.S. Geological Survey [USGS] 2016). State and local government entities own approximately 1.4% of the Plan Area (USGS 2016). Tribal lands in the Plan Area belong to the Alabama-Coushatta Tribes of Texas (approximately 4,477 acres in Polk County); the Kickapoo Traditional Tribe of Texas (approximately 121 acres in Maverick County); and the Kiowa Indian Tribe, Comanche Nation, Apache Tribe of Oklahoma (approximately 205 acres in Wichita and Clay Counties; these acres are not federally recognized tribal lands) (USGS 2016). Figure 9 shows the distribution of land ownership in Texas and Table 5 summarizes the extent of different land ownership types in the Plan Area.[5]

[5] The land ownership data from USFWS (2016) only include public open space lands and do not include public lands used for administrative purposes (e.g., county courthouses, city buildings, police stations).

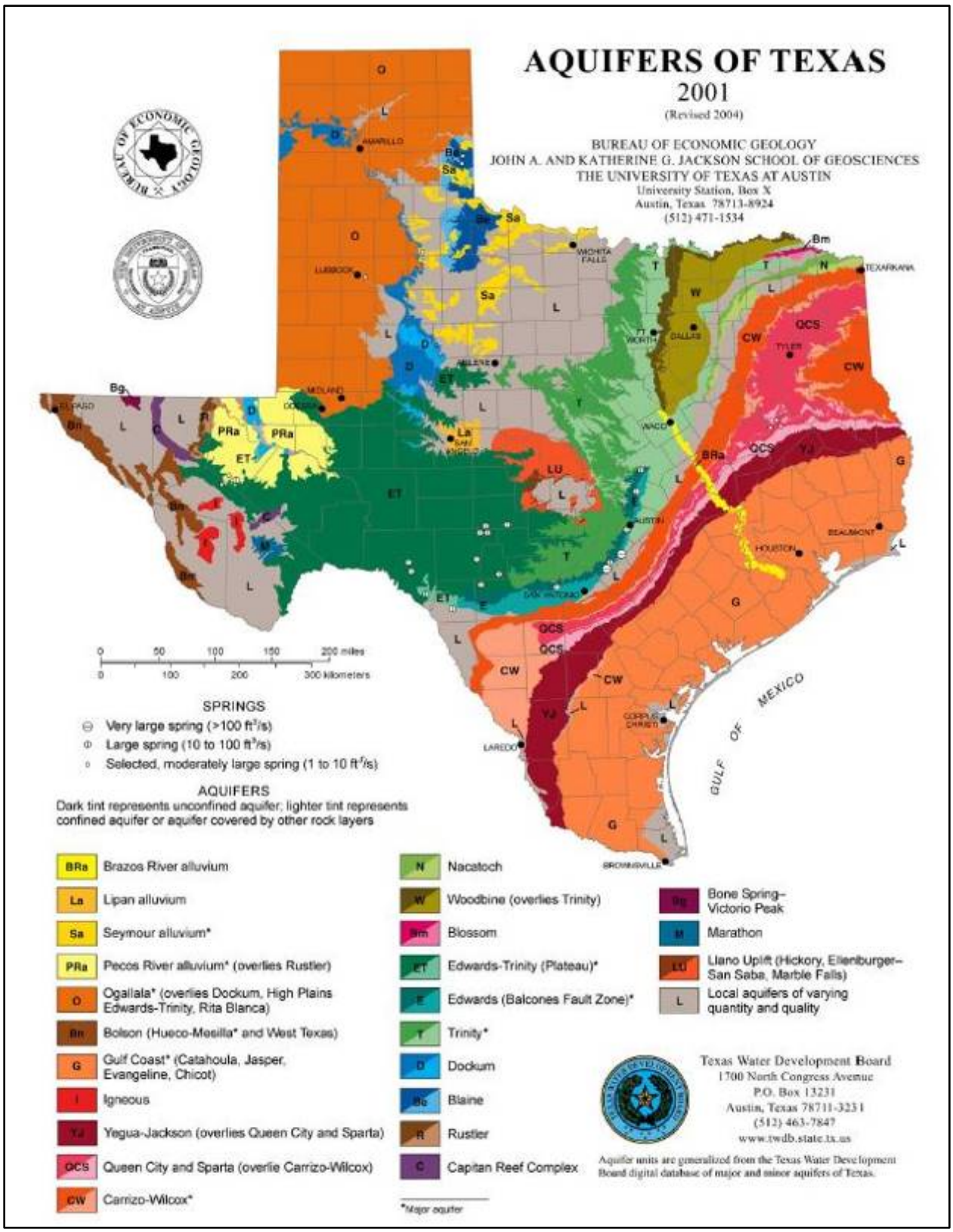

Figure 8. Aquifers and major springs of Texas.

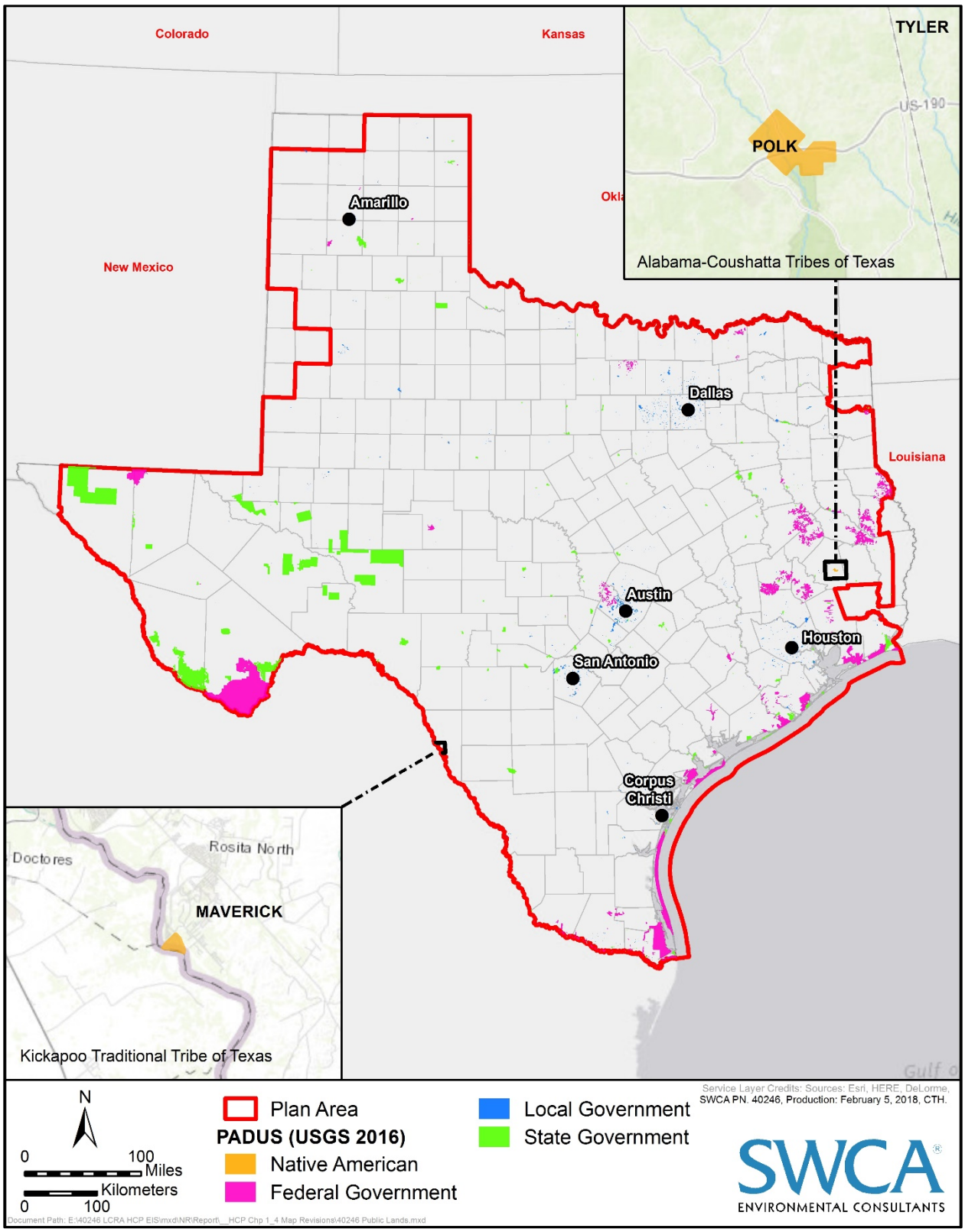

Figure 9. Public open space lands in Texas.

Table 5. Public Open Space Land in the Plan Area

Ownership Type	Property Types	Geographic Representation (% of Plan Area)
Federal		3.33%
U.S. Fish and Wildlife Service	*National Wildlife Refuges*	*0.89%*
National Park Service	*National Parks, Wilderness Areas, National Recreation Areas, National Seashores, Wild and Scenic Rivers, National Historic Places and Sites*	*1.09%*
U.S. Army Corps of Engineers	*Recreation Reservoirs*	*0.57%*
Forest Service	*National Forests, Experimental Forests, National Grasslands, Roadless Areas, Wilderness Areas, Recreation Areas*	*0.49%*
Department of Defense Military Lands	*Forts and Bases*	*0.21%*
Other Federal Agencies		*0.08%*
State	Parks, Natural Areas, Wildlife Management Areas, Forests, Historic Sites, Fish Hatcheries, University and School Lands, Trust Lands	1.41%
Regional Agency Special Districts	River Authorities, Water Districts	0.03%
County and City	Parks, Preserves	0.15%
American Indian	Alabama-Coushatta Tribes of Texas, Kickapoo Traditional Tribe of Texas, Kiowa Indian Tribe, Comanche Nation, Apache Tribe of Oklahoma	0.003%

Source: U.S. Geological Survey (2016)

CHAPTER 3. COVERED SPECIES

LCRA TSC evaluated 247 Species of Concern (i.e., species that are currently listed as threatened or endangered; are proposed, candidates, or petitioned for future listing; are identified on current USFWS listing work plans; or are listed by the State of Texas as threatened or endangered) for the potential for take resulting from its activities involving the construction, operation, upgrade, decommissioning, and maintenance of its Facilities (Appendix B). Based on the high-level evaluation in Appendix B and additional consideration of available information, LCRA TSC identified 23 Covered Species. The USFWS currently lists 22 of the Covered Species as threatened or endangered and is evaluating the remaining species (the spot-tailed earless lizard, *Holbrookia lacerata*) for possible future listing. Each of the Covered Species is, or has the potential to become, listed as threatened or endangered by the USFWS over the ITP Term and, as described in Chapter 5, the best available information suggests that individuals of these species may, under certain circumstances, be taken by LCRA TSC Activities.

Table 6 lists the Covered Species by taxon and the current federal listing status of each species.

Table 6. Covered Species

Common Name	Scientific Name	Federal Listing Status
BIRDS		
Golden-cheeked warbler	*Setophaga chrysoparia*	Endangered
Whooping crane	*Grus americana*	Endangered
Piping plover	*Charadrius melodus*	Threatened
Rufa red knot	*Calidris canutus rufa*	Threatened
Red-cockaded woodpecker	*Picoides borealis*	Endangered
MAMMALS		
Ocelot	*Leopardus pardalis*	Endangered
REPTILES		
Spot-tailed earless lizard	*Holbrookia lacerata*	Not listed, petitioned for listing
AMPHIBIANS		
Houston toad	*Anaxyrus (*formerly *Bufo) houstonensis*	Endangered
Barton Springs salamander	*Eurycea sosorum*	Endangered
Georgetown salamander	*Eurycea naufragia*	Threatened, with 4(d) Special Rule
Jollyville Plateau salamander	*Eurycea tonkawae*	Threatened
Salado Springs salamander	*Eurycea chisholmensis*	Threatened
San Marcos salamander	*Eurycea nana*	Threatened
INVERTEBRATES		
Comal Springs riffle beetle	*Heterelmis comalensis*	Endangered
Peck's Cave amphipod	*Stygobromus pecki*	Endangered
Bee Creek Cave harvestman	*Texella reddelli*	Endangered
Tooth Cave spider	*Tayshaneta myopica*	Endangered

Common Name	Scientific Name	Federal Listing Status
Tooth Cave ground beetle	*Rhadine persephone*	Endangered
Madla Cave meshweaver	*Cicurina madla*	Endangered
Government Canyon Bat Cave spider	*Tayshaneta microps*	Endangered
Helotes mold beetle	*Batrisodes venyivi*	Endangered
Elongate ground beetle with no common name	*Rhadine exilis*	Endangered
Robust ground beetle with no common name	*Rhadine infernalis*	Endangered

As discussed in Appendix B and Chapter 6.3, LCRA TSC is not seeking coverage for other Species of Concern, including some listed species, because: 1) they occur in habitats or locations where LCRA TSC Activities are unlikely to occur; 2) LCRA TSC will avoid take with the application of practicable, voluntary conservation measures; 3) incidental take coverage is available through other existing programmatic HCPs; and/or 4) federal listing as threatened or endangered is not anticipated during the ITP Term. LCRA TSC is not including federally listed plants as Covered Species because it does not anticipate that the LCRA TSC Activities will violate the ESA with respect to listed plants and the USFWS has stated that because "[i]mpacts to plants do not fall under the definition of 'take'…[USFWS] cannot authorize incidental take of plants" (USFWS and NMFS 2016:7−2). LCRA TSC considered the effects of LCRA TSC Activities on federally listed species of fish, wildlife, and plants not included as Covered Species (see Appendix B) and, where appropriate, will voluntarily implement measures to avoid prohibited takings (see Chapter 6.2) or, if take of listed fish or wildlife cannot be avoided, will seek separate ESA authorization.

CHAPTER 4. LCRA TSC FACILITIES AND ACTIVITIES

4.1 LCRA TSC FACILITIES

LCRA TSC Facilities include both structures and lands, such as:

- overhead electric transmission lines (the most common type of Facility),
- underground electric transmission lines (rarely installed in urban areas, near airports, or in other areas with height or space limitations; only 0.03% of LCRA TSC's Facilities at the time of HCP preparation (circa 2017) are underground electric transmission lines),
- electric substations, switching stations, and other site-based support Facilities (non-linear Facilities);
- off-easement access roads needed to reach LCRA TSC lines and stations; and
- lands LCRA TSC either owns or has rights (through easements or other means) on which to construct and maintain structures associated with its transmission lines, site-based support facilities, and access roads.

LCRA TSC's current electric transmission lines convey energy in bulk at 69, 138, or 345 kilovolts (kV) from power generation facilities to substations, and eventually to residential, business, commercial, and industrial power customers. As of 2017, LCRA TSC owned or operated approximately 5,200 miles of electric transmission lines that carry electricity to substations and switching stations (Figure 10). Substations use transformers to step the transmission line voltage down for transfer to smaller electric distribution lines. Switching stations serve as termination points for multiple transmission lines and can isolate faults on the system to protect the remaining equipment from damage. LCRA TSC currently operates more than 400 electric substations and switching stations (Figure 10). Together, the physical structures comprising LCRA TSC's transmission lines, site-based support facilities, and access roads and appurtenances are the Structures. Table 7 provides additional detail regarding Structures.

LCRA TSC constructs, operates, and maintains its transmission lines and access roads within linear corridors. LCRA TSC constructs, operates, and maintains substations and switching stations on parcels of land that may contain several acres. LCRA TSC has the right—through land ownership, easements, access agreements, cooperative agreements with other agencies, or other means—to construct and maintain its Structures within these lands. LCRA TSC generally owns the land associated with its site-based support Facilities, but typically has only limited control or use of lands comprising the linear corridors. For the purpose of this HCP, all lands associated with Facilities—whether in linear corridors or on parcels containing site-based support Facilities like substations or switching stations—are referred to as Rights-of-Way (ROWs). Table 7 provides additional detail regarding ROWs.

Figure 10 shows the location of LCRA TSC's Facilities as of the preparation of the HCP (circa 2017). However, LCRA TSC anticipates the need to expand this network of existing Facilities over the ITP Term. Future Facilities may be located anywhere within the Plan Area, but current LCRA TSC plans suggest that, in the near-term (i.e., within the next 5 to 10 years), future Facilities are most likely to be in a handful of central, west, and south Texas counties.

Table 7 describes the typical aspects of different types of Facilities, including structure dimensions, ROW widths, surface and subsurface Disturbance footprints, and distribution. LCRA TSC uses these typical values to help assess the effects of LCRA TSC Activities on the Covered Species and to estimate the amount and extent of incidental take that may arise from Covered Activities over the ITP Term.

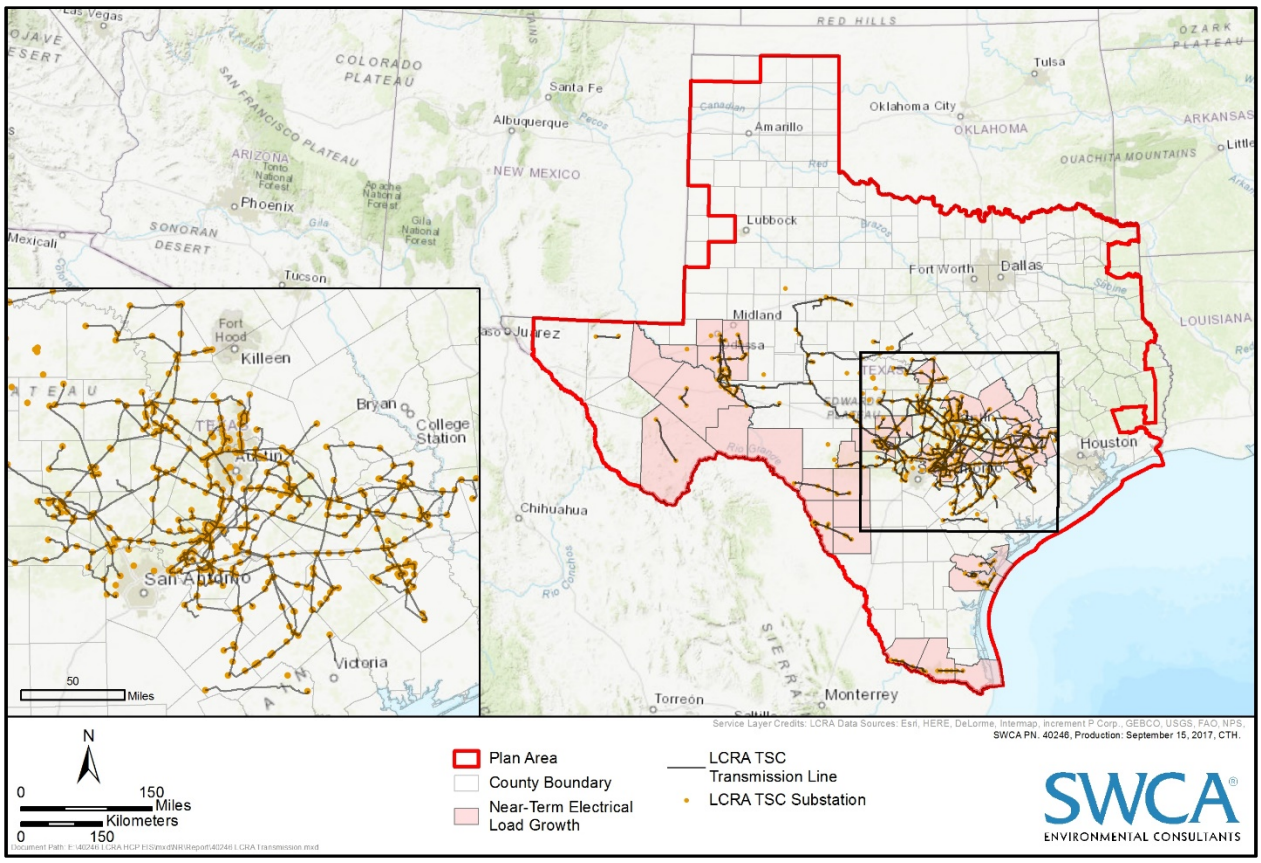

Figure 10. LCRA TSC Facilities as of 2017.

Table 7. Typical Characteristics of Facilities

Structure Type	Right-of-Way	Physical Structures	Surface Extent	Subsurface Extent
Overhead Electric Transmission Lines (69, 138, or 345-kV)	• 50 to 200 feet wide (assumed average of 120 feet wide)	• Conducting wires strung on single pole, double pole/H-frame, or steel lattice structures • 5 to 10 structures per mile (assumed average 8 per mile)	• Vegetation modification across full extent of ROW • Structures reach 40 to 255 feet above ground	• Soil or subsurface Disturbance over approximately 0.15 to 0.35 acre per structure (assumed average of 0.25 acre per structure) • Excavation for foundation/footing extends maximum 6 to 45 feet below ground
Underground Electric Transmission Lines	• 20 to 60 feet wide (assumed average 50 feet wide)	• Conducting wires laid underground in trenches or bores	• Vegetation modification across full extent of ROW • No above ground structures	• Trenches and bore pits 3 to 20 feet wide (assumed average of 15 feet wide) • Excavation typically extends 6 to 13 feet below ground (deeper if by directional bore)

Structure Type	Right-of-Way	Physical Structures	Surface Extent	Subsurface Extent
Site-Based Support Facilities	• 3 to 20 acres per support facility (assumed average 10 acres)	• Road base at or above existing grade, with a subsurface ground grid • Perimeter fencing or walls • Access roads and driveways • A-frame structures • Dead-end transmission structures (180 to 210 feet tall) • Communication towers (typically less than 300 feet tall) • Detention or retention pond (occasionally; not all facilities require such ponds)	• Vegetation modification across full extent of ROW • Structures reach 15 to 300 feet above ground	• Soil or subsurface Disturbance over full extent of ROW • Surface grading may reach 0.5 to 8 feet below ground • Structure foundations/footing may reach 6 to 45 feet below ground
Access Roads	• 20 to 50 feet wide (assumed average of 25 feet wide)	• Road base at or near existing grade, with culverted or at-grade (i.e., "Arizona") water crossings • 500 feet per support facility (outside of support facility site) • 100 feet per mile of transmission line (outside of transmission line ROW)	• Vegetation modification across full extent of ROW • Road base and culverts to 25 feet wide	• Soil or subsurface Disturbance over full extent of ROW • Surface grading or rare cut/fill may reach 0.5 to 8 feet below ground

4.2 LCRA TSC ACTIVITIES

LCRA TSC Activities are actions performed within the Plan Area during the ITP Term that, under certain circumstances, are likely to cause incidental take of one or more Covered Species. LCRA TSC Activities include the construction, operation, maintenance, upgrade, and decommissioning of its Facilities. As described and defined in greater detail in Chapter 6 of this HCP, Covered Activities are those LCRA TSC Activities that obtain coverage for incidental take through this HCP and related ITP. Although not all LCRA TSC Activities will become Covered Activities, all Covered Activities fit within the descriptions provided below.

For the purposes of this HCP, LCRA TSC identifies the following classes of LCRA TSC Activities: 1) New Construction; 2) Upgrading and Decommissioning; 3) Operations and Maintenance; and 4) Emergency Responses.[6] These classes of LCRA TSC Activities differ with respect to the involvement of previously modified[7] or unmodified lands, and with respect to how LCRA TSC plans for or implements the activity. For example, New Construction typically involves the construction of new Structures, the acquisition of new ROWs, and Disturbance of previously unmodified lands, whereas the other LCRA

[6] Outside of the context of the HCP, LCRA TSC does not categorize, group, or plan its activities using these classes.

[7] Previously modified lands are lands where natural vegetation has been replaced with developed land cover (including developed open spaces, such as yard or landscaping) or agricultural crops, or lands that are regularly maintained in a manner that precludes the natural progression of vegetation succession (such as regularly maintained rights-of-way).

TSC Activities classes typically involve existing Structures and ROWs and previously modified lands. Also, LCRA TSC typically plans for New Construction and Upgrading and Decommissioning well in advance, whereas Operations and Maintenance and Emergency Responses may occur on a routine or an "as-needed" basis.

The following subchapters describe each class of LCRA TSC Activities, including the types of equipment used to perform LCRA TSC Activities, and the duration and frequency of LCRA TSC Activities.

4.2.1 New Construction

LCRA TSC occasionally constructs new Facilities, and incidental take associated with construction and the impacts of that taking may be covered through this HCP. The process of determining where new transmission lines and substations will be located is governed by the PUC and is not within the control of LCRA TSC. Therefore, the process of routing or siting new Facilities is not an activity covered by this HCP. Nevertheless, in Chapter 1.4, LCRA TSC provides a brief description of the PUC routing and siting process as context for understanding how the existing state-level regulatory process of the PUC balances impacts on affected environments, communities, and landowners. Ultimately, the PUC determines where new Facilities will be located and how they will be constructed (i.e., overhead or underground).

4.2.1.1 Typical New Construction Activities

Once the route or site for a new Facility is established, New Construction involves a set of pre-construction, construction-phase, and post-construction activities that typically involve the acquisition of ROW[8] and activities conducted on previously unmodified lands (i.e., greenfield construction). However, not all New Construction will involve previously unmodified lands. Some new Facilities may be co-located with other existing infrastructure, such as other utilities lines or roads, or cross developed lands or crop fields. Where such co-location occurs, LCRA TSC may perform New Construction activities fully or partially on previously modified lands having prior surface and/or subsurface Disturbances.

Typical New Construction activities may involve the following:

- **Land Survey**—New Construction frequently requires pre-construction professional land surveying to locate transmission line or support facility centerlines, stake out structure locations, easement boundaries, property boundaries, and similar features. Land surveys may include hand clearing of vegetation when necessary to establish line-of-sight for survey positions. Land surveys involve pedestrian traffic and the use of small vehicles (e.g., all-terrain vehicles [ATVs] or pick-up trucks), chainsaws, machetes, loppers, string trimmers, and/or unmanned aerial vehicles (UAVs). Land surveyors typically cover 2 to 3 miles of transmission line ROW per day or complete surveying of site-based support facilities in 1 to 5 days.
- **Pre-construction Investigations**—Geotechnical, natural, and cultural resource investigations may involve small amounts of pre-construction digging, drilling, boring, or clearing to assess the condition of natural and cultural resources associated with new ROWs. These activities may include hand clearing of vegetation when necessary for access by people and equipment. Geotechnical borings are typically 6 inches in diameter and 20 to 50 feet deep. Drilling equipment requires a set-up and staging area of up to 100 by 100 feet (0.23 acre); however, most such set-up areas are smaller than this. Investigations for karst invertebrate habitat and cultural

[8] LCRA TSC may acquire ROW through fee simple title (land ownership), easements, access agreements, cooperative agreements with other agencies, or other means. LCRA TSC generally owns the land associated with its site-based stations, but typically has only limited control or use of lands comprising linear corridors.

resources may also require very limited digging or trenching. Pre-construction investigations involve pedestrian traffic and the use of passenger vehicles and drilling rigs. Crews can typically complete field investigations for one to four structure locations per day.

- **Access Road Construction or Improvement**—New Construction often requires the pre-construction installation of new access roads or improvement of existing access roads to or within Facilities. LCRA TSC has a preference, to the extent practicable, for improving existing access roads over the construction of new roads. Access road activities may involve hand or mechanical vegetation clearing, surface grading, cut/fill, placement of at-grade or above-grade road base or similar material, installation of culverts or fill at water crossings, and reinforcement of construction site entrances from public roadways. LCRA TSC constructs or improves access roads to the minimum width necessary to provide access (typically 20 feet wide, with wider segments at turns and at construction site entrances). Access road activities involve pedestrian traffic and the use of passenger vehicles, bulldozers, track loaders, hydro-axes, tractors with rotary or flail mowers, back hoes, chipper trucks, lift trucks, dump trucks, and similar machinery. Access road construction typically proceeds at 0.25 to 0.5 mile per day. Construction of a water crossing typically requires 3 hours to 1 day. Crews typically complete one to three construction site entrances per day.
- **Erosion and Sedimentation Controls**—Addressing erosion and sedimentation (E&S) concerns involves the pre-construction installation of E&S controls as required by Texas Commission on Environmental Quality (TCEQ) or local ordinances to address storm water discharges during construction. Such installation may require the placement of silt fencing, sediment logs, rock berms, geotextile fabrics, and similar materials within ROWs. These activities also include the maintenance of E&S controls during the construction and post-construction phases. Often, LCRA TSC performs follow-on monitoring of E&S controls after installation to ensure continued functionality and to document that restoration activities are successful. Activities related to E&S controls involve pedestrian traffic and the use of passenger vehicles, bulldozers, track loaders, tractors, and similar machinery.
- **Vegetation Clearing**—New Construction frequently requires the pre-construction removal of vegetation from LCRA TSC ROWs in advance of other surface or subsurface Disturbances or the installation of Structures. LCRA TSC seeks to minimize the amount of vegetation disturbed during construction, except to the extent necessary to establish ROW clearance for Structures. LCRA TSC operates under a policy for oak wilt prevention. Vegetation clearing may involve pedestrian traffic and the use of ATVs, passenger vehicles, skid-steers, hydro-axes, tractors with rotary or flail mowers, chipper trucks, lift trucks, dump trucks, and similar machinery. Vegetation removed from ROWs is usually chipped on site and either removed from the ROW for disposal (such as a permitted composting facility) or spread out on the surface to a depth that allows vegetation to regenerate. Vegetation clearing typically proceeds at a pace of 0.25 to 0.5 mile per day.
- **Surface Grading, Trenching, and Boring**—This group of activities involves construction-phase subsurface Disturbances of soil and bedrock to establish proper grade for foundations or to excavate for the installation of footings or underground Facilities. These activities may involve pedestrian traffic and the use of bulldozers, track hoes, dump trucks, drilling rigs, boring/directional drilling equipment, trenchers, and similar machinery. LCRA TSC typically stockpiles excavated materials on-site within ROWs and reuses this material as backfill following installation of Structures. LCRA TSC removes any excess materials from ROWs for disposal.
- **Installation of Structures**—New Construction involves the construction-phase installation of foundations and footings, assembly and erection of Structures, laying of subsurface conduits, installation of hardware on Structures, stringing conductors or ground wires on structures, and

installation and testing of dielectric fluids and cathodic protection systems. Installations may involve aboveground and belowground Structures. Installation of Structures may involve pedestrian traffic and the use of passenger vehicles, ATVs, skid-steers tractors, cranes, wire carts, tensioners, track hoes, bulldozers, dump trucks, helicopters, and similar machinery. The pace of installation for overhead electric transmission lines varies from one to four Structures per day, and pace of installation for underground electric transmission lines varies from 0.25 to 1 mile per month.

- **Post-construction Restoration**—Post-construction restorations involve the clean-up, stabilization, and restoration of lands modified during construction to re-establish vegetative cover sufficient to meet TCEQ or local standards. LCRA TSC does not dispose of any excavated material in wetlands, water bodies, or streambeds. LCRA TSC returns disturbed areas to pre-construction contours, to the extent practicable. LCRA TSC adheres to TCEQ's Texas Pollutant Discharge Elimination System regulations for post-construction restorations, which require that any disturbed areas be revegetated to 70% of the pre-construction vegetation conditions. However, LCRA TSC does not restore access roads, since continued access to LCRA TSC Facilities is needed for operation and maintenance. LCRA TSC uses native grass/forb seed mixes for restoration purposes, considering reasonable landowner preferences for alternative species, as appropriate. Post-construction restoration typically involves pedestrian traffic and the use of passenger vehicles, bulldozers, track loaders, tractors, and similar machinery.

The schedule for completing a New Construction project typically involves 4 to 5 years, from conception to operation.

4.2.1.2 Anticipated Amount of New Construction

Based on activities completed during the 5 years before initiation of the HCP planning process (2011 to 2016) and near-term plans for activities in the next 5 years (2017 to 2021), LCRA TSC estimates that it may construct approximately 3,000 miles of new overhead electric transmission lines, 5 miles of new underground electric transmission lines, and 60 new support facilities over the ITP Term. Associated with these new transmission lines and support facilities would be an estimated 63 miles of new or improved access roads outside of transmission line ROWs or support facility sites. The specific circumstances of each New Construction project will vary, sometimes substantially, depending on the type and location of the project; therefore, LCRA TSC assumes that New Construction involves 70% previously unmodified lands (i.e., greenfield construction) and 30% previously modified lands disturbed by existing infrastructure or land uses (i.e., New Construction that is fully or partially co-located with other facilities or cropland).

Table 8 includes estimates of the anticipated surface and subsurface Disturbances for New Construction over the ITP Term by Structure type, using the typical descriptions in Table 7. The Disturbance estimates associated with New Construction are intentionally generous to capture potential Disturbances associated with Emergency Responses with similar impact types (Chapter 4.2.4). The estimates in Table 8 provide a theoretical maximum extent of Disturbance associated with New Construction, although not all New Construction will become a Covered Activity (see Chapter 6).

Table 8. Estimated Extent of New Construction Activities over ITP Term

Structure Type	Anticipated Amount	Surface Disturbance (acres)		Subsurface Disturbance (acres)	
		Previously Modified Lands	Previously Unmodified Lands	Previously Modified Lands	Previously Unmodified Lands
Overhead Electric Transmission Lines	3,000 miles	13,050	30,450	1,800	4,200
Underground Electric Transmission Lines	5 miles	9	21	3	6
Site-Based Support Facilities	60 facilities	180	420	180	420
Access Roads	63 miles*	57	134	57	134
TOTAL for New Construction	**–**	**13,296**	**31,025**	**2,040**	**4,760**

* Based on typical length of access road outside of transmission line ROWs and support sites in Table 7.

4.2.2 Upgrading and Decommissioning

Over time, LCRA TSC may modify existing Structures to add a new circuit to an existing double-circuit capable structure, rebuild an existing transmission line by replacing Structures or conductors/wires, expand an existing site-based support facility, or decommission (i.e., remove) an LCRA TSC Structure entirely. LCRA TSC upgrades Structures more frequently than it decommissions Structures; however, decommissioning of a transmission line or support Facility may still occur over the ITP Term. Decommissioning removes the Structures associated with the Facility, but in most cases LCRA TSC would retain ownership of the associated ROW. For the purposes of this HCP only, LCRA TSC addresses activities associated with upgrading an existing facility or decommissioning an existing facility as a single class of Covered Activity.

Upgrading and Decommissioning activities involve many of the same types of activities as described for New Construction (also possibly including reconductoring activities described in the Operations and Maintenance activity class) and will not be repeated here. However, unlike for New Construction, this class of Covered Activity does not involve the routing or siting process and largely involves existing ROWs. The schedule for completing an Upgrading or Decommissioning project, from conception to operation, typically involves 1 to 3 years.

LCRA TSC estimates that it may upgrade or (rarely) decommission approximately 1,050 miles of overhead electric transmission lines, 1 mile of underground electric transmission line, and 180 site-based support Facilities (such as substations and switching stations) over the ITP Term. For estimating Disturbances over the ITP Term, LCRA TSC does not address upgrading access roads to these Structures in this class of Covered Activity, because LCRA TSC typically maintains access roads as part of its Operations and Maintenance activities.

Most surface Disturbances associated with Upgrading and Decommissioning activities involve previously modified lands. However, LCRA TSC may require new ROW for certain types of Structure upgrades, such as the expansion of an existing electric substation. For subsurface Disturbances, however, upgrading an existing Structure may create the opportunity for Disturbances of previously unmodified subsurface lands (e.g., where a new hole must be drilled to install a replacement pole). LCRA TSC assumes that 80% of surface and subsurface Disturbances related to Upgrading and Decommissioning will involve previously modified lands and the remaining 20% will involve previously unmodified lands. LCRA TSC

also assumes that upgrades to site-based support facilities will involve only a portion of the acreage of a typical site (i.e., 2 acres per facility, instead of 10 acres per facility).

Table 9 summarizes the estimated extent of surface and subsurface Disturbances associated with Upgrading and Decommissioning activities over the ITP Term. The Disturbance estimates associated with Upgrading and Decommissioning are intentionally generous to capture potential Disturbances associated with Emergency Responses with similar impact types (Chapter 4.2.4). Although many Upgrading and Decommissioning activities will not become Covered Activities (see Chapter 6), the estimates in Table 9 provide a theoretical maximum extent of Disturbance associated with Upgrading and Decommissioning.

Table 9. Estimated Extent of Upgrading and Decommissioning Activities over ITP Term

Structure Type	Anticipated Amount	Surface Disturbance (acres)		Subsurface Disturbance (acres)	
		Previously Modified Lands	Previously Unmodified Lands	Previously Modified Lands	Previously Unmodified Lands
Overhead Electric Transmission Lines	1,050 miles	12,180	3,045	1,680	420
Underground Electric Transmission Lines	1 mile	5	1	1	-
Site-Based Support Facilities	180 facilities	288	72	288	72
Access Roads*	–	–	–	–	–
TOTAL for Upgrading and Decommissioning	**–**	**12,473**	**3,118**	**1,969**	**492**

* Assumes that LCRA TSC maintains access roads as part of routine Operations and Maintenance activities.

4.2.3 Operations and Maintenance

For the purposes of this HCP, LCRA TSC places activities related to the operation and maintenance of its Facilities into four categories, described immediately below. LCRA TSC routinely performs Operations and Maintenance activities at all its Facilities. Operations and Maintenance activities vary by type, frequency, duration, intensity, and the degree of planning that precedes implementation. Some Operations and Maintenance activities are constant (e.g., lighting or noise at electric substations), others are scheduled at regular intervals (e.g., vegetation management), whereas still others occur only on an as needed basis (e.g., the replacement of damaged hardware discovered during an inspection). However, the common feature of all Operations and Maintenance activities is that they involve existing ROWs and previously modified lands (both surface and subsurface). Most such activities are also relatively minor in scale or intensity.

Typical Operations and Maintenance activities may involve the following:

- **Vegetation Management**—Vegetation management involves removing trees or brush, trimming or topping trees or brush, mowing grasses and other herbaceous vegetation, controlling weeds around the perimeter of site-based support facilities, and reseeding bare soils with native grasses and forbs. Vegetation management is most often accomplished by mechanical means (e.g., cutting, shredding, grubbing, and mowing), but may include the application of low-volume basal or foliar-applied herbicides. Vegetation management may involve pedestrian traffic and the use

of ATVs, passenger vehicles, chainsaws, skid-steers, hydro-axes, tractors with rotary or flail mowers, chipper trucks, lift trucks, dump trucks, backhoes, and similar machinery. The pace of vegetation management varies, but averages approximately 2.5 miles of transmission line per day. Frequency of vegetation management per Facility varies between 2 and 5 years.

- **Patrols and Inspections**—Patrols and inspections are routine activities to regularly assess the condition of Facilities. LCRA TSC personnel drive ROWs in ATVs or pick-ups, or use UAVs to perform inspections. The pace of inspections varies from 5 to 20 miles per day. The frequency of inspections varies from once per year for 345-kV transmission lines and critical 138-kV transmission lines to once every 2 years for other Facilities.
- **Hardware Replacement**—This activity involves replacing faulty or obsolete hardware on Structures, such as insulators, cross arms, lightning arrestors, bird diverters or discouragers, marker balls, and similar items. Hardware replacements may involve pedestrian traffic and the use of pick-up trucks, lift trucks, boom trucks, and cranes. The pace of hardware replacements along transmission lines varies, but LCRA TSC can service approximately four to eight Structures per day. Such replacements occur only as needed.
- **Reconductoring**—Reconductoring means replacing conductor wires on existing transmission Structures or previously excavated trenches/bores. LCRA TSC may reconductor Facilities to replace aging or damaged wire or to increase electrical reliability (see Upgrading and Decommissioning). This class of activity also includes the replacement of ground (i.e., shield or static) wire. LCRA TSC commonly performs this activity to facilitate the addition of fiber communications by replacing the existing ground wire with optical ground wire. Reconductoring may involve vehicle and machinery use within existing ROWs, but generally avoids creating new surface or subsurface Disturbances. However, re-excavation of a previously excavated trench may be needed to access underground electric transmission lines. This activity may involve pedestrian traffic and the use of pick-up trucks, lift trucks, boom trucks, cranes, wire carts, tensioners, helicopters, or similar machinery. The pace of reconductoring averages approximately 4 miles per week.

To estimate the extent of surface and subsurface Disturbances associated with Operations and Maintenance activities, LCRA TSC first approximates the size of its network of Facilities at the end of the ITP Term and then approximates how much of that system is likely to be subject to Operations and Maintenance activities each year (Table 10). LCRA TSC estimates the future size of its network from its current inventory of Facilities and the additions to that network from its anticipated New Construction activities. Most Operations and Maintenance activities involve low levels of human activity (e.g., patrols and inspections and hardware replacement) or are relatively infrequent (e.g., reconductoring or rewiring); therefore, LCRA TSC estimates Disturbances for the entire class of Operations and Maintenance activities based on recurring vegetation management at a frequency of once every 5 years (i.e., involving 20% of the total facility network each year or the entire network 6 times over the ITP Term). As previously stated, all Operations and Maintenance activities involve repeated Disturbances of previously modified lands.

The Disturbance estimates associated with Operations and Maintenance activities are intentionally generous to capture potential Disturbances associated with Emergency Responses with similar impact types (Chapter 4.2.4). The estimates in Table 10 provide a theoretical maximum extent of Disturbance associated with repeated Operations and Maintenance over the ITP Term, although most Operations and Maintenance activities will not become a Covered Activity (see Chapter 6).

Table 10. Estimated Operations and Maintenance Activities over ITP Term

Structure Type	Anticipated Amount†	Surface Disturbance (acres)		Subsurface Disturbance (acres)	
		Previously Modified Lands	Previously Unmodified Lands	Previously Modified Lands	Previously Unmodified Lands
Overhead Electric Transmission Lines	5,200 miles existing + 3,000 miles new = 8,200 miles × 6 recurrences	142,680	–	19,680	–
Underground Electric Transmission Lines	2 miles existing + 5 miles new = 7 miles × 6 recurrences	54	–	18	–
Site-Based Support Facilities	400 facilities existing + 60 facilities new = 460 facilities × 6 recurrences	5,520	–	5,520	–
Access Roads*	136 miles existing* + 63 miles new = 199 miles × 6 recurrences	726	–	726	–
TOTAL for Operations and Maintenance	**–**	**148,980**	–	**25,944**	–

* Assumes that LCRA TSC maintains access roads as part of routine Operations and Maintenance activities.
† Assumes Operations and Maintenance activities occur across the entire network of LCRA TSC Facilities 6 times over the 30-year ITP Term.

4.2.4 Emergency Responses

Given the nature of LCRA TSC's Facilities, emergencies may arise that could have extremely detrimental and potentially life and property threatening consequences. LCRA TSC responds promptly to all emergencies and takes every action necessary to ensure that human health and safety are protected and that essential utility services are quickly restored when disrupted. Weather or other natural hazards are the most common trigger for Emergency Responses. Emergencies, regardless of cause, may require the replacement of Structures, reconductoring, vegetation clearing for new access routes or laydown/set-up areas, and similar activities. Therefore, Emergency Responses involve aspects of the three other classes of LCRA TSC Activities.

However, depending on the nature and magnitude of the Emergency Response, standard practices associated with planned or routine LCRA TSC Activities may not be practical or prudent for responding swiftly and effectively to an emergency. Where practicable, LCRA TSC conducts Emergency Response activities within existing ROWs. However, in some instances, Emergency Responses may require actions outside of these areas.

LCRA TSC retains final judgment on whether a given situation qualifies as an Emergency Response. The first priority of LCRA TSC will be to safely resolve the emergency as soon as practicable.

LCRA TSC believes that its estimates for future activities involving New Construction, Upgrading and Decommissioning, and Operations and Maintenance are reasonable, but generous. Therefore, since Emergency Responses are both rare and consistent with the other classes of LCRA TSC Activities, LCRA TSC has not developed separate estimates for the extent of Disturbances associated with Emergency Responses. LCRA TSC believes that the totals for New Construction, Upgrading and Decommissioning, and Operations and Maintenance adequately capture the extent of Disturbances that are likely to arise from Emergency Responses over the ITP Term.

4.3 SUMMARY OF LCRA TSC ACTIVITIES OVER ITP TERM

4.3.1 Amount or Extent

LCRA TSC summarizes the extent of the anticipated surface and subsurface Disturbances associated with LCRA TSC Activities over the ITP Term in Table 11. Although most LCRA TSC Activities will not become Covered Activities subject to the provisions of this HCP (see Chapter 6), the estimates in Table 11 provide a theoretical maximum extent for Covered Activities associated with each class of LCRA TSC Activities.

Table 11. Estimated Extent of Disturbance Associated with LCRA TSC Activities over ITP Term

LCRA TSC Activities	Surface Disturbance (total acres)		Subsurface Disturbance (total acres)	
	Previously Modified Lands	Previously Unmodified Lands	Previously Modified Lands	Previously Unmodified Lands
New Construction	13,296	31,025	2,040	4,760
Upgrading and Decommissioning	12,473	3,118	1,969	492
Operations and Maintenance*	148,980	-	25,944	-
Emergency Responses†	-	-	-	-
TOTAL	**174,749**	**34,143**	**29,953**	**5,252**

* Assumes Operations and Maintenance activities occur across the entire network of LCRA TSC Facilities 6 times over the 30-year ITP Term.

†LCRA TSC accounts for Emergency Responses within the other classes of LCRA TSC Activities and does not provide separate estimates for Disturbances associated with Emergency Responses.

4.3.2 Geographic Distribution

LCRA TSC's implementation of LCRA TSC Activities will not occur evenly across the Plan Area over the ITP Term. Instead, LCRA TSC expects some parts of the Plan Area to receive proportionately more or less estimated Disturbances from LCRA TSC Activities than other parts. LCRA TSC defines the following Activity Zones, comprising various Plan Area counties as shown in Figure 11, to help geographically apportion its activities:

1. **Counties with Existing Facilities (Existing Facilities Activity Zone)**—These counties contain existing Facilities and LCRA TSC is certain to perform some or all LCRA TSC Activities in these counties. The Existing Facilities Activity Zone includes 79 counties.
2. **Counties with Anticipated Future Electrical Load Growth (Future Growth Activity Zone)**—LCRA TSC identifies these counties as areas where future electrical load growth is likely to occur in the next 5 to 10 years. LCRA TSC foresees that some or all these counties will receive New Construction during the ITP Term. The Future Growth Activity Zone includes three counties that are not already contained within the Existing Facilities Activity Zone.
3. **Counties Adjoining Existing Facilities and Future Growth Activity Zones (Adjoining Activity Zone)**—LCRA TSC typically expands its transmission system by branching from existing substations. Therefore, counties within ERCOT that are adjacent to those contained within the Existing Facilities and Future Growth Activity Zones are more likely to receive New Construction during the ITP Term than those that are farther removed from existing Facilities. The Adjoining Activity Zone includes 47 counties.

4. **Counties Outside of ERCOT (Outside ERCOT Activity Zone)**—LCRA TSC defined the Plan Area to include Texas counties that border those within ERCOT to accommodate the unlikely, but still possible, circumstance that a small portion of a Facility extends beyond the boundary of ERCOT. However, LCRA TSC does not expect to perform many activities in this border region. The Outside ERCOT Activity Zone includes 33 counties.
5. **Other Plan Area Counties (Other Counties Activity Zone)**—The remaining counties in the Plan Area may receive New Construction, or LCRA TSC may acquire Facilities built by other entities and perform other LCRA TSC Activities on such Facilities. However, LCRA TSC has no special focus on these counties at this time. The Other Counties Activity Zone contains 79 counties.

Figure 11 depicts the Activity Zones for the Plan Area. For planning purposes, LCRA TSC distributes the estimated Disturbances from LCRA TSC Activities to the Activity Zones as follows:

- **New Construction**—75% to the combined counties of the Existing Facilities, Future Growth, and Adjoining Activity Zones; 24% to the Other Counties Activity Zone; 1% to the counties of the Outside ERCOT Activity Zone;
- **Upgrading and Decommissioning**—90% to the counties of the Existing Facilities Activity Zone; 9% to the combined counties of the Future Growth and Adjoining Activity Zones; 1% to the combined counties of the Outside ERCOT and Other Counties Activity Zones;
- **Operations and Maintenance**—75% to the combined counties of the Existing Facilities, Future Growth, and Adjoining Activity Zones; 24% to the Other Counties Activity Zone; 1% to the counties of the Outside ERCOT Activity Zone; and
- **Emergency Responses**—Disturbances from this class of LCRA TSC Activities are included in the estimates for the other classes of LCRA TSC Activities.

Table 12 estimates the extent of Disturbances from LCRA TSC Activities by Activity Zone. On a county level, which will be relevant to calculating estimates of take in Chapter 5, LCRA TSC simply distributes the Disturbances within each Activity Zone equally across the counties of that Activity Zone. Appendix C contains the county-level estimates of Disturbance. However, LCRA TSC intends that the take allocation for a particular Covered Species may be applied anywhere across the Plan Area where needed for that species, regardless of the county-level Disturbance estimate.

Table 12. Estimated Geographic Distribution of LCRA TSC Activities by Activity Zone

Activity Zone	Surface Disturbance (total acres)		Subsurface Disturbance (total acres)	
	Previously Modified Lands	Previously Unmodified Lands	Previously Modified Lands	Previously Unmodified Lands
Existing Facilities	85,759	17,056	14,625	2,629
Future Growth	2,898	558	499	86
Adjoining	45,398	8,742	7,813	1,342
Outside ERCOT	1,660	319	286	49
Other Counties	39,034	7,468	6,730	1,146
TOTAL	**174,749**	**34,143**	**29,953**	**5,252**

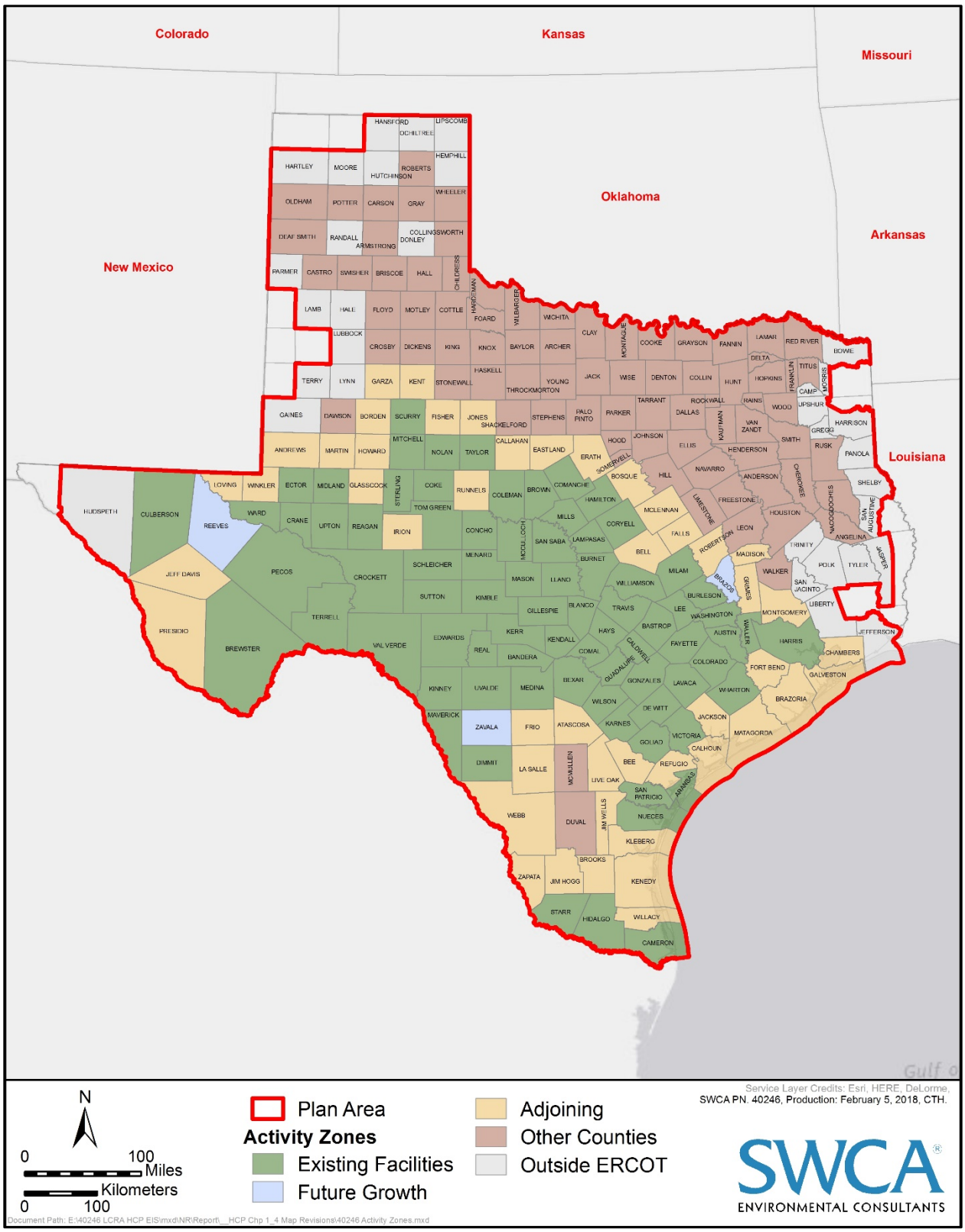

Figure 11. Activity Zones within the Plan Area

CHAPTER 5. EFFECTS, TAKE ESTIMATES, AND IMPACTS

The Disturbance estimates in Table 11 approximate the maximum possible anticipated extent of LCRA TSC Activities over the ITP Term. LCRA TSC will likely enroll only some of these LCRA TSC Activities in the HCP, depending on a variety of considerations (see Chapter 6). LCRA TSC approaches the estimation of take from Covered Activities and the assessment of the impacts of such take on each Covered Species by:

1. Describing the effects of the LCRA TSC Activities on individuals of the Covered Species;
2. Estimating the amount of take for each Covered Species that is reasonably certain to occur because of the Covered Activities, using a habitat surrogate metric to quantify the amount of take; and
3. Assessing the impact of estimated take on the status of each Covered Species based on the proportion of potential habitat affected in the Plan Area and across the range of the Covered Species.

This three-part analysis establishes the amount of take for each Covered Species that LCRA TSC requests from the USFWS and provides the biological basis for the level of conservation that minimizes and mitigates the impacts of the taking to the maximum extent practicable. Given the large number of Covered Species, LCRA TSC provides species-specific information supporting this analysis in Appendix D and SWCA Environmental Consultants (SWCA) (2019).

5.1 EFFECTS OF THE LCRA TSC ACTIVITIES

The first step in this analysis is to describe how the LCRA TSC Activities may affect individuals of a Covered Species in ways that may lead to take. See Chapter 1.1 of this HCP for the statutory and regulatory definitions of take. The effects of the LCRA TSC Activities will vary with respect to the type, location, land use context, timing, and duration of the LCRA TSC Activities and with respect to the distribution, presence, habitat, and behavior of each Covered Species. Only a fraction of the LCRA TSC Activities will rise to the level of take of an individual of a Covered Species and therefore may become a Covered Activity. However, LCRA TSC anticipates that its LCRA TSC Activities will take some individuals of each of the Covered Species by killing, wounding, or harming—or a combination thereof—over the ITP Term. LCRA TSC does not anticipate that its LCRA TSC Activities will take Covered Species by any other form of take (i.e., pursue, hunt, shoot, trap, capture, or collect).[9]

LCRA TSC anticipates that some of its LCRA TSC Activities may have effects that rise to the level of take of one or more Covered Species because of:

1. **Habitat Removal**—Vegetation clearing, trenching, or other aspects of the LCRA TSC Activities can directly remove habitat for a Covered Species. Where habitat removal actually kills or injures an individual of a Covered Species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering, then take via ***harm***, as defined in 50 CFR §17.3, occurs.

[9] To implement the conservation measures described in Chapter 6 of this HCP, LCRA TSC may need to perform project-specific studies to document the presence or absence of a Covered Species at a project site, monitor populations of a Covered Species within a preserve, or conduct other beneficial conservation actions that could take a Covered Species (e.g., harass, pursue, capture, collect). However, LCRA TSC will rely on the take authorizations of ESA Section 10(a)(1)(A) permits for these beneficial activities. Section 10(a)(1)(A) permits are held by biologists qualified to work with the Covered Species and authorize take that is associated with scientific research on a listed species or to aid in the recovery of a listed species. Most Section 10(a)(1)(A) permits require that permittees follow USFWS-approved protocols for surveys and other beneficial conservation actions and report results of these activities to the USFWS.

2. **Habitat Degradation**—LCRA TSC Activities can reduce the quality or carrying capacity of habitats for Covered Species without completely removing the habitat. Where habitat degradation actually kills or injures an individual of a Covered Species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering, then take via ***harm***, as defined in 50 CFR §17.3, occurs.

3. **Habitat Fragmentation and Edge Effects**—A form of habitat degradation, fragmentation can exacerbate the effects of habitat removal by altering the configuration of remaining habitats. Habitat fragmentation can increase a Covered Species' exposure to potential edge effects and, in some cases, decrease the ability of a Covered Species to disperse or move across the landscape. Where habitat fragmentation or edge effects, or both, actually kills or injures an individual of a Covered Species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering, then take via ***harm***, as defined in 50 CFR §17.3, occurs.

4. **Collision**—The activities of people, vehicles, equipment, and machinery when conducting the LCRA TSC Activities can create opportunities to physically encounter individuals of Covered Species. Where such collisions foreseeably ***kill or wound*** an individual of a Covered Species, take occurs. Collisions can occur under two types of circumstances: 1) when an individual of a Covered Species collides with Structures; or 2) when people, vehicles, equipment, or machinery collide with an individual of a Covered Species during the conduct of LCRA TSC Activities.

   LCRA TSC routinely implements best practices and other voluntary conservation measures that deter birds, including those that are Covered Species, from nesting on, colliding with, or being electrocuted by LCRA TSC transmission lines (see Chapter 6.4). Because of these measures, LCRA TSC does not expect the simple presence of Structures to create opportunities for Covered Species to collide with these Structures in a manner that would result in take. For this reason, LCRA TSC is not requesting incidental take authorization for Covered Species colliding with Structures. Collision with Structures, if incidentally observed, would constitute a Changed Circumstance (Chapter 9).

   LCRA TSC does, however, request authorization for incidental take of Covered Species occurring because of people, vehicles, equipment, and/or machinery that is being used in the course of conducting LCRA TSC Activities foreseeably, physically encountering a Covered Species (e.g., running over or colliding with a Covered Species). For example, a tractor used to mow grass within a ROW could run over and kill or wound a member of a Covered Species known to occur in the area.

5. **Herbicide Application**—The legal application of herbicides, where such materials are toxic to Covered Species, can ***kill or wound*** individuals that encounter these materials. The legal application of herbicides can also degrade habitats for the Covered Species (see notes regarding habitat degradation above).

6. **Noise and Activity Disruptions**—Noise and visual activity created by people, vehicles, equipment, and machinery during conduct of the LCRA TSC Activities can modify the habitats used by individuals of the Covered Species by introducing disturbances that can cause such individuals to modify their behavior. Where noise and activity disruptions significantly modify habitats to the extent that the disruptions actually kills or injures an individual of a Covered Species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering, take via ***harm***, as defined in 50 CFR §17.3, may occur.

7. **Predator/Prey Community Changes—**Addition of transmission facilities to the landscape and the ongoing maintenance of those facilities can promote the occurrence or abundance of some wildlife species and demote others, changing the composition of the local wildlife community and, potentially, the dynamics of the predator and prey relationships for Covered Species. Where

changes to the wildlife community proximately and foreseeably caused by LCRA TSC Activities actually kills or injures an individual of a Covered Species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering, then take via ***harm***, as defined in 50 CFR §17.3, occurs.

LCRA TSC provides species-specific information on likely effect pathways in Appendix D and SWCA (2019). LCRA TSC can link each of these potential effect pathways, and any resulting take, to aspects of the LCRA TSC Activities that directly or indirectly modify habitat used by a Covered Species (see Appendix D). Some effects of the LCRA TSC Activities are limited to habitats within specific areas of physical activity, such as the footprints of surface or subsurface Disturbances associated with the LCRA TSC Activities (Direct Habitat Modification). See Chapter 4 for a description of the typical Disturbance footprints of the LCRA TSC Activities. Other effects may extend beyond these Disturbance footprints into areas outside of and adjacent to ROWs (Indirect Habitat Modification). For example, habitat removal is generally limited to the Disturbance footprints of the LCRA TSC Activities, whereas noise and activity disruptions may affect Covered Species in habitats occurring adjacent to ROWs.

Table 13 identifies the geographic extents of effects of the LCRA TSC Activities (i.e., Direct and Indirect Habitat Modification) that LCRA TSC uses as part of a conceptual model to estimate the amount of take for each Covered Species over the ITP Term. The values in Table 13 point to certain values in Table 11 for total acres of Disturbance over the ITP Term associated with New Construction and Upgrading and Decommissioning and to the average annual acres of Disturbance for Operations and Maintenance. Where possible, LCRA TSC relied on the distances used in other USFWS-approved HCPs, Biological Opinions, or other conservation agreements to describe the likely extent of effects beyond areas of Direct Habitat Modification. Otherwise, LCRA TSC made such assumptions after consideration of the best available information about the Covered Species and the various aspects of its LCRA TSC Activities (Appendix D; SWCA 2019). LCRA TSC provides additional rationale for the estimated geographic extent of the effects of the LCRA TSC Activities for each class in the paragraphs following Table 13.

The information shown in Table 13 is part of LCRA TSC's conceptual model for estimating the amount of take for each Covered Species over the ITP Term. It is important to note that LCRA TSC uses the information in Table 13 only for estimating the total amount of take that may be associated with this HCP over the ITP Term. LCRA TSC will assess take for Covered Activities through the HCP's Conservation Program (see Chapter 6) based on project- and site-specific data. If, over time, LCRA TSC anticipates that its requested take authorization may be insufficient to address its need to perform Covered Activities, LCRA TSC may seek to amend the HCP and ITP to receive additional take authorization from USFWS.

Table 13. Conceptual Geographic Extent of Effects from LCRA TSC Activities

Covered Species	Disturbances Associated with Direct Habitat Modification*	Disturbances Associated with Indirect Habitat Modifications*
Golden-cheeked warbler	S/PUM	S/PUM-Adj 300 ft
Whooping crane	SS/PUM + SS/PM	S/PUM-Adj 1,000 ft
Piping plover	SS/PUM + SS/PM	S/PUM-Adj 1,000 ft
Rufa red knot	SS/PUM + SS/PM	S/PUM-Adj 1,000 ft
Red-cockaded woodpecker	S/PUM	S/PUM-Adj 300 ft
Ocelot	S/PUM	S/PUM-Adj 500 ft
Spot-tailed earless lizard	SS/PUM + SS/PM	S/PUM + S/PM

Covered Species	Disturbances Associated with Direct Habitat Modification*	Disturbances Associated with Indirect Habitat Modifications*
Houston toad	S/PUM	S/PUM-Adj 50 ft
Terrestrial Karst Invertebrates	SS/PUM + S/PM	S/PUM
Aquatic Species	SS/PUM	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft

* **S**-Surface Disturbance; **SS**-Subsurface Disturbance; **PM**-Previously Modified Lands; **PUM**-Previously Unmodified Lands
Adj-Adjacent (indicating the distance of effects beyond areas of ROW associated with the noted Disturbance type; i.e., S/PUM-Adj 300 ft means that Disturbances associated with Indirect Habitat Modifications extend 300 feet beyond the limits of surface Disturbances of previously unmodified lands)

- **Golden-cheeked Warbler and Red-cockaded Woodpecker**—These species use habitat comprising tree canopy that occurs in relatively large, contiguous patches (albeit with some variation). Habitat modifications are most likely to originate from LCRA TSC Activities that involve surface Disturbances of previously unmodified lands. Once removed, these canopy habitats are not likely to regrow within ROWs due to LCRA TSC's regular Operations and Maintenance activities. The USFWS has consistently used a distance of 300 feet from the edge of a Direct Habitat Modification to approximate the extent of potential Indirect Habitat Modification related to noise and activity disruptions and edge effects for the golden-cheeked warbler (*Setophaga chrysoparia*; see the LCRA TSC's *Competitive Renewable Energy Zone Transmission Lines HCP*, approved by the USFWS in 2012, as an example). LCRA TSC also applies this distance to estimate the extent of Indirect Habitat Modifications for the red-cockaded woodpecker (*Picoides borealis*), since Delaney et al. (2002) suggests that flushing from military training noises declines at distances beyond approximately 295 feet and was minimal when the noise source was greater than approximately 397 feet away.
- **Whooping Crane, Piping Plover, and Rufa Red Knot**—These species use habitats on the ground, rather than in the canopy, that occur in areas of relatively open vegetation communities. In such circumstances, the extent of subsurface Disturbances—which capture Disturbances modifying the soil surface—best approximates areas of Direct Habitat Modification and may be applicable to both previously modified and previously unmodified lands. In open environments, potential noise and activity disruptions may travel farther than in more closed-canopy environments. The USFWS has applied a distance of 1,000 feet from areas of Direct Habitat Modification to approximate the extent of Indirect Habitat Modification for the whooping crane (*Grus americana*; see the USFWS's *Biological Opinion for the Hal Jones Development for The Reserve*, consultation number 21410-2009-F-0113, as an example). Koenen (1995) also reports that only 5% of interior least terns (a species with similar habits as the piping plover [*Charadrius melodus*] and rufa red knot [*Calidris canutus rufa*]) flushed from nests in response to human activity at a distance of 984 feet. On this basis, LCRA TSC applies a distance of 1,000 feet from areas subject to Direct Habitat Modification for estimating the extent of potential effects associated with Indirect Habitat Modification.
- **Houston Toad**—The Houston toad (*Anaxyrus* [formerly *Bufo*] *houstonensis*) occurs in forested habitats and lives on or under the soil surface. LCRA TSC approximates the extent of Direct Habitat Modifications for this species by the area associated with surface modifications of previously unmodified lands. Once modified, the forest cover is not likely to regrow within ROWs due to ongoing Operations and Maintenance. There is no published information indicating that the Houston toad would be taken by noise or activity disturbances or other edge effects extending beyond ROWs. Therefore, LCRA TSC conservatively estimates that any Indirect Habitat Modifications will only extend 50 feet beyond the limits of surface Disturbances.

- **Spot-tailed Earless Lizard**—The spot-tailed earless lizard (*Holbrookia lacerata*) generally uses open habitats and is associated with herbaceous vegetation or the bare ground under sparsely vegetated herbaceous cover. This kind of habitat can occur even on previously modified lands, and such modification may even enhance the habitat after a relatively short period of temporary disruption. As this species lives on or under the ground surface, LCRA TSC approximates the extent of Direct Habitat Modifications for the spot-tailed earless lizard as subsurface Disturbances of previously unmodified or previously modified lands. Such modifications may ultimately have a beneficial, or at least neutral, effect on the habitat for this Covered Species; therefore, LCRA TSC proposes a relatively narrow extent for Indirect Habitat Modifications approximated by the extent of surface Disturbances to previously modified or previously unmodified lands.
- **Ocelot**—Ocelots (*Leopardus pardalis*) use very dense, low, thorny, shrubland habitat in relatively large and connected patches. LCRA TSC approximates the extent of Direct Habitat Modification associated with the LCRA TSC Activities as surface Disturbances to previously unmodified lands. The U.S. Department of Homeland Security approximated the extent of indirect effects to ocelots related to the construction, operation, and maintenance of tactical infrastructure in the Rio Grande Valley (e2M 2008) using a distance of 500 feet from the activity. LCRA TSC proposes to use a similar distance to approximate the extent of Indirect Habitat Modification for this species.
- **Terrestrial Karst Invertebrates**—This class of Covered Species includes 8 species of invertebrates that occur in subterranean caves and mesocavernous spaces in portions of central Texas. Although much of the basic biology of these 8 species remains unstudied, their habitats are generally similar. LCRA TSC approximates the extent of Direct Habitat Modification for the Terrestrial Karst Invertebrates as the extent of subsurface Disturbances of previously modified or unmodified lands within the known ranges of these species. While it is unlikely that previously excavated bedrock would continue to function as suitable habitat for Terrestrial Karst Invertebrates, this type of Disturbance also includes modifications of the soil surface (i.e., such as surface grading) that are unlikely to penetrate deeply into the subsurface geology. Therefore, for this conceptual model, subsurface Disturbances include previously modified lands. Much of the energy input to these subterranean habitats comes from the surface; therefore, LCRA TSC approximates the extent of Indirect Habitat Modifications as the extent of surface Disturbances of previously unmodified lands.
- **Aquatic Species**—The Aquatic Species class includes 5 species of spring-associated salamanders (Table 6), the Comal Springs riffle beetle (*Heterelmis comalensis*), and the Peck's Cave amphipod (*Stygobromus pecki*). Direct Habitat Modifications of surface habitat is unlikely as LCRA TSC is able, in most circumstances[10], to span waterways and avoid the need to place fill or excavate through a stream or other water body. However, in some circumstances, subsurface Disturbances (such as excavation) near the edge of a waterbody could cause Direct Habitat Modifications for aquatic species by intercepting ground water or draining surface water. Therefore, LCRA TSC estimates Direct Habitat Modification for the Aquatic Species as the extent of subsurface Disturbances near such habitats. The LCRA TSC Activities may also cause Indirect Habitat Modifications to these aquatic habitats by altering the adjacent riparian vegetation. LCRA TSC approximates the extent of such Indirect Habitat Modifications as the

[10] LCRA TSC attempts to span water bodies by placing Structures on either side—not within—the water body whenever feasible. For example, LCRA TSC currently operates and maintains transmission lines that span or occur along the edge of Landa Lake (in Comal County) and Spring Lake (in Hays County); neither of which have Structures that occur in the water. LCRA TSC would continue to span these two water bodies, should future upgrades to these lines occur. However, engineering or other constraints may in other rare circumstances require LCRA TSC to place a Structure, such as a transmission tower or pole, within a water body in other locations.

extent of surface Disturbances of previously unmodified or previously modified land within ROWs and adjacent impacts up to 50 feet beyond the ROW.

5.2 AMOUNT OF REQUESTED TAKE

5.2.1 Habitat Surrogate for Take of Individuals

An important premise of this HCP relating to take is that it is not practical to quantify take in terms of the numbers of individuals of the Covered Species killed, wounded, harmed, or otherwise incidentally taken by the LCRA TSC Activities. The USFWS's Surrogate Rule (50 CFR §402.14) allows (at least in the context of an ESA Section 7 consultation) the use of surrogate measures for quantifying the amount and extent of take in cases where the incidental take statement or biological opinion:

1. describes the causal link between the surrogate and take of the listed species;
2. explains why it is not practical to express the amount or extent of anticipated take or to monitor take-related impacts in terms of individuals of the listed species; and
3. sets a clear standard for determining when the level of anticipated take has been exceeded.

Although the USFWS's Surrogate Rule was cast in the context of ESA Section 7 consultations, the concept of using a surrogate metric for measuring take of individuals works by analogy in HCPs, since the issuance of an ITP triggers consultation under ESA Section 7. LCRA TSC proposes to measure take in terms of the acres of Suitable Habitat with assumed occupancy or Occupied Habitat with demonstrated occupancy for each Covered Species that are directly or indirectly modified by the Covered Activities (Habitat Surrogate). Use of the Habitat Surrogate to quantify take for each of the Covered Species meets the three conditions established in the USFWS Surrogate Rule (50 CFR §402.14). Appendix D and SWCA (2019) set forth for each Covered Species the information required by the Surrogate Rule to justify use of the Habitat Surrogate. There is significant USFWS precedent for the use of such surrogate metrics in HCPs. Federal courts have upheld the USFWS' use of habitat as a proxy for take under Section 7 of the ESA,[11] and it is common practice of the USFWS to use surrogate metrics for many of this HCP's Covered Species in both the ESA Section 7 and Section 10 contexts.

5.2.2 Conceptual Model for Estimating Take

At this time, LCRA TSC lacks details about the specific type, location, timing, and duration of most of its LCRA TSC Activities over the ITP Term, and even the locations of Operations and Maintenance activities will change over the ITP Term as LCRA TSC constructs or acquires facilities in the future. This lack of project-specific detail is, of course, not uncommon in HCPs of a programmatic nature. Therefore, LCRA TSC estimates take of the Covered Species caused by Covered Activities using assumptions about:

1. the amount of Disturbance associated with the LCRA TSC Activities (Table 11);
2. the distribution of these Disturbances across the Plan Area Activity Zones (Table 12, Appendix C);

[11] *Arizona Cattle Growers' Ass'n v. U.S. Fish and Wildlife Service*, 273 F.3d 1229, 1248-1250 (9th Cir. 2001) (agreeing that USFWS may use habitat as a surrogate for take and upholding one—but not all—incidental take statements under review); *Audubon Soc. Of Portland v. National Marine Fisheries Service*, 849 F.Supp.2d 1017, 1045-46 (D. Oreg. 2011); *Oregon Natural Desert Ass'n v. Tidwell*, 716 F.Supp.2d 982, 999 (D. Oreg. 2010) ("the use of ecological conditions as a surrogate for defining the amount or extent of incidental take is reasonable so long as these conditions are linked to the take of the protected species.")

3. the geographic extent of effects on Covered Species that are likely to cause take (i.e., the Covered Species' potential exposure to take) (Table 13);
4. the distribution of potential habitats for the Covered Species across the Plan Area (Appendix D, Appendix E, and SWCA 2019);
5. the proportional overlap of take-causing effects and potential habitats for the Covered Species (see Chapter 5.2.4 for an example calculation); and
6. the likelihood of such effects rising to the level of take (Appendix F and Chapter 5.2.3).

These assumptions are the components of LCRA TSC's conceptual model for estimating take of the Covered Species arising from the Covered Activities over the ITP Term, and the basis for its overall take request to the USFWS. This conceptual model provides a rational basis for estimating the amount of take for each Covered Species that LCRA TSC may need over the ITP Term. The take estimate for each Covered Species produced by the conceptual model is not, however, a statement that the Covered Activities will actually cause that amount of take. Rather, LCRA TSC will determine the actual amount of take caused by the Covered Activities as part of the operating Conservation Program of this HCP as it is applied to specific projects over the ITP Term (see Chapter 6). LCRA TSC will debit actual take from its overall allocation of take authorization, with the overall allocation for each Covered Species based on the output of the conceptual model. If LCRA TSC uses all of its allocated take authorization for a particular Covered Species before the end of the ITP Term, it may avoid future take of that Covered Species, use other means for obtaining take authorization, or request additional take authorization from the USFWS through the amendment process described in Chapter 8.4. In cases where LCRA TSC has not fully used the take allocation for a Covered Species by the end of the ITP Term, LCRA TSC will not be obligated to minimize or mitigate the impacts of authorized, but unutilized take.

5.2.3 Fine-tuning the Take Estimates

Recognizing that many LCRA TSC Activities will not become Covered Activities and that the conceptual model only provides a generalized estimate of take associated with LCRA TSC Activities, LCRA TSC also estimates—in a very general and high-level manner—the percentage of LCRA TSC Activities that are reasonably certain to actually cause take and therefore become a Covered Activity. LCRA TSC provides these estimates for each Covered Species, shown in Appendix F (see the Take Likelihood Factor), based on the best available information, considering the various aspects of its future activities and estimates of Disturbance, LCRA TSC's generally coarse and landscape-level approach to estimating the extent of potential habitats, and the general distribution of each Covered Species in areas of potential habitat (Appendix D, SWCA 2019). Ultimately, this aspect of the conceptual model is intended to adjust the take estimates to reach an amount or extent of take that LCRA TSC believes is reasonable to request from the USFWS for the ITP Term.

5.2.4 Take Estimates for Covered Species

For each county in the Plan Area, LCRA TSC produced an estimate of the acres that may be disturbed by LCRA TSC Activities over the ITP Term (i.e., the application of Steps 1 through 4 of the conceptual model, see Appendix C) and the acres of potential habitat for each Covered Species (see Appendix D, Appendix E, and SWCA 2019). LCRA TSC estimates the amount of take for each Covered Species over the ITP Term—using the Habitat Surrogate—by calculating the proportional overlap of take-causing effects and potential habitats and adjusting this raw estimate (as described in Chapter 5.2.3) for the likelihood of take actually occurring.

For example, LCRA TSC calculated the amount of incidental take for each Covered Species by county in the following manner, then summing across all counties in the Plan Area:

([Relevant ITP Term Disturbances] + [Relevant Average Annual Disturbances × 30 years]) × % of County as Habitat × Take Likelihood Factor = Acres of Incidental Take over ITP Term

Relevant Disturbances are those specified in Table 13 (i.e., the geographic area where take-causing effects are anticipated) for Direct and Indirect Habitat Modification. Where such effects occur within specified distances outside of, but adjacent to, ROWs, LCRA TSC calculated the acres subject to such Indirect Habitat Modification as a multiple of each associated acre within the ROW. For the purposes of this calculation, LCRA TSC assumes a typical ROW width of 120 feet (see Table 7), where a ROW length of 363 feet is needed to capture one acre of ROW (i.e., 120 feet wide × 363 feet long = 43,560 square feet = 1 acre). Therefore, where the effects of Indirect Habitat Modification extend 300 feet beyond the edge of the ROW, LCRA TSC applies a factor of 5.0 to the relevant Disturbances that generate the effect, as follows:

300 feet wide [*adjacent impact distance*] × 363 feet long [len*gth of ROW that captures one acre in a 120-foot-wide typical ROW*] × 2 [*captures each side of the ROW*] ÷ 43,560 feet per acre = 5.0 acres of Indirect Habitat Modification associated with each acre of ROW

Table 14 summarizes the estimated amount of incidental take for each Covered Species, which includes acres of incidental take arising from both Direct and Indirect Habitat Modifications. Where the calculations in Appendix F result in less than 1 acre of estimated incidental take for a Covered Species, LCRA TSC increased the estimate to 1 acre.

Note that these take estimates do not imply that potential habitats for the Covered Species will be completely lost because of Covered Activities. Rather, these take estimates approximate the geographic area in which take of individuals of the Covered Species, as measured in terms of Direct and Indirect Habitat Modification, may occur. Appendix F includes county-level calculations estimating take for each Covered Species.

LCRA TSC requests maximum take authorization for each Covered Species from the USFWS over the ITP Term in the amounts shown in Table 14. Although LCRA TSC derived these take estimates at the county level, LCRA TSC intends that the take allocation for a particular Covered Species may be applied anywhere across the Plan Area where needed for that species, regardless of the county-level take estimate. It is also important to repeat that these take estimates are conceptual or theoretical maximums to ensure that, barring unforeseen circumstances, LCRA TSC will not run out of take authorization for a Covered Species during the ITP Term.

Table 14. Maximum Estimated Take of the Covered Species from Covered Activities

Covered Species	Take Estimate (acres)	Covered Species	Take Estimate (acres)
BIRDS		**MAMMALS**	
Golden-cheeked warbler	8,396 acres	Ocelot	230 acres
Whooping crane	1,973 acres	**INVERTEBRATES**	
Piping plover	129 acres	Comal Springs riffle beetle	1 acre
Rufa red knot	129 acres	Peck's Cave amphipod	1 acre
Red-cockaded woodpecker	528 acres	Bee Creek Cave harvestman	88 acres
AMPHIBIANS		Tooth Cave spider	10 acres
Houston toad	1,024 acres	Tooth Cave ground beetle	14 acres
Barton Springs salamander	5 acres	Madla Cave meshweaver	10 acres*

Covered Species	Take Estimate (acres)	Covered Species	Take Estimate (acres)
Georgetown salamander	3 acres	Government Canyon Bat Cave spider	10 acres*
Jollyville Plateau salamander	16 acres	Helotes mold beetle	10 acres*
Salado Springs salamander	1 acre	*Rhadine exilis*	10 acres*
San Marcos salamander	2 acres	*Rhadine infernalis*	10 acres*
REPTILES			
Spot-tailed earless lizard	1,750 acres		

* Not to be applied within Bexar County, Texas.

5.3 IMPACTS OF THE TAKING ON COVERED SPECIES

LCRA TSC describes the impact of its requested maximum potential take for each Covered Species in terms of the proportions of potential habitat in the Plan Area and across the species' range that are associated with the requested amount of incidental take. As shown in Table 15, LCRA TSC's requested take is very small as a percentage of total amount of habitat within range of each Covered Species. In fact, for many Covered Species, the requested take is less than 0.2%, and the maximum is only 0.7%. LCRA TSC notes that not all take as quantified herein using the Habitat Surrogate equates to complete habitat loss or the death of an individual of a Covered Species—ensuring that this assessment, which treats habitat degradation and sub-lethal effects to individuals the same as habitat loss or death, is conservative. Furthermore, this assessment sets forth potential impacts without application of the minimization and mitigation measures of the Conservation Program described in Chapter 6 (for example, the General and Specific Minimization Measures described in Chapter 6.4 and the offsetting Mitigation estimates in Table 16), again ensuring that this assessment of impacts is conservative.

LCRA TSC notes that a more precise assessment of impact of its incidental take on the status of the Covered Species is not possible at this time given the programmatic nature of this HCP. However, LCRA TSC will prepare more precise assessments of incidental take for Covered Activities as it implements the Conservation Program of this HCP (see Chapter 6). LCRA TSC commits to avoiding take that would jeopardize the continued existence of a listed species or that would destroy or adversely modify Critical Habitat. For example, LCRA TSC commits to avoid performing, to the extent possible, Covered Activities within 50 feet of a karst feature known to be occupied by one or more of the Terrestrial Karst Invertebrates or a spring outlet and associated spring run or lake known to be occupied by one or more of the Aquatic Species, and to coordinate with the USFWS to identify and implement other practicable minimization measures within a certain distance of such features (see Chapter 6.4.1). LCRA TSC describes these commitments in Chapter 6. LCRA TSC further assesses in Appendix G the impacts of the incidental taking, with consideration of the minimization and mitigation measures described in the Conservation Program, to address the likelihood of the Covered Activities jeopardizing the continued existence of any listed species or causing the destruction or adverse modification of Critical Habitat.

Table 15 summarizes the impact of the maximum requested take on each Covered Species. LCRA TSC provides additional information supporting the assessment in Appendix D, Appendix E, and SWCA (2019).

Table 15. Requested Take Compared to the Amount of Potential Habitat

Covered Species	Estimated Potential Habitat in Plan Area	Take as Percentage of Potential Habitat in Plan Area	Estimated Potential Habitat in Range	Take as Percentage of Potential Habitat in Range
BIRDS				
Golden-cheeked warbler	4,148,149	0.20%	4,148,149	0.20%
Whooping crane	373,806	0.53%	373,806	0.53%
Piping plover	243,751	0.05%	601,018	0.02%
Rufa red knot	243,751	0.05%	601,018	0.02%
Red-cockaded woodpecker	2,131,022	0.02%	24,407,002	0.00%
MAMMALS				
Ocelot	78,288	0.29%	6,443,668	0.00%
REPTILES				
Spot-tailed earless lizard	9,520,962	0.02%	9,520,962	0.02%
AMPHIBIANS				
Houston toad	1,238,279	0.08%	1,238,280	0.08%
Barton Springs salamander	977	0.51%	977	0.51%
Georgetown salamander	1,031	0.29%	1,031	0.29%
Jollyville Plateau salamander	4,331	0.37%	4,331	0.37%
Salado Springs salamander	372	0.27%	372	0.27%
San Marcos salamander	372	0.54%	372	0.54%
INVERTEBRATES				
Comal Springs riffle beetle	54	0.00%	54	0.00%
Peck’s Cave amphipod	138	0.72%	138	0.72%
Bee Creek Cave harvestman	203,685	0.04%	203,685	0.04%
Tooth Cave spider	15,331	0.07%	15,331	0.07%
Tooth Cave ground beetle	22,238	0.06%	22,239	0.06%

Covered Species	Estimated Potential Habitat in Plan Area	Take as Percentage of Potential Habitat in Plan Area	Estimated Potential Habitat in Range	Take as Percentage of Potential Habitat in Range
Madla Cave meshweaver	20,162	0.05%	133,573	0.01%
Government Canyon Bat Cave spider	20,162	0.05%	39,527	0.03%
Helotes mold beetle	20,162	0.05%	56,315	0.02%
Rhadine exilis	20,162	0.05%	133,573	0.01%
Rhadine infernalis	20,162	0.05%	133,573	0.01%

CHAPTER 6. CONSERVATION PROGRAM

LCRA TSC will, on a case-by-case basis, select LCRA TSC Activities to enroll in this HCP. LCRA TSC Activities that are enrolled in this HCP are Covered Activities. Covered Activities are specific instances of one or more LCRA TSC Activities performed within a specific geographic area during a specific period. The ITP authorizes incidental take of the Covered Species that is caused by Covered Activities and requires LCRA TSC to implement the provisions of this HCP relevant to the specific Covered Activity.

Chapter 6.1 identifies LCRA TSC's goals and objectives for this HCP. In Chapters 6.2 and 6.3, LCRA TSC describes the considerations it may use for deciding whether to enroll a specific instance of LCRA TSC Activities in the HCP, such as voluntary measures for avoiding take or using other means for obtaining incidental take authorization. In Chapter 6.4, LCRA TSC describes how it will minimize the impacts of incidental take caused by Covered Activities. Chapter 6.5 describes how LCRA TSC will implement Mitigation for Covered Activities. Chapter 6.6 describes the process that LCRA TSC will use to determine the amount of incidental take and Mitigation associated with each Covered Activity. Additional species-specific considerations for Covered Activities are included in Appendix D, including: how to delineate Suitable Habitat, perform Presence/Absence Surveys, delineate Occupied Habitat, identify Existing Impacts and Special Cases, estimate incidental take from Direct and Indirect Habitat Modifications, apply Specific Minimization Measures, and determine the amount of required Mitigation. The voluntary Avoidance Measures, the enrollment process, and the suite of minimization and Mitigation measures described in Chapter 6 are the Conservation Program of this HCP. LCRA TSC will document actions taken to implement the Conservation Program in an Annual Report of HCP activities (see Chapter 8.1).

6.1 CONSERVATION PROGRAM GOALS AND OBJECTIVES

LCRA TSC seeks to achieve both operational and biological goals and objectives with this HCP. The operational goals and objectives address LCRA TSC's underlying purpose and need for the HCP, whereas the biological goals and objectives guide LCRA TSC's approach to the conservation of the Covered Species. Both sets of goals and objectives are essential to the direction of the Conservation Program.

6.1.1 Operational Goals and Objectives

LCRA TSC seeks to achieve the following operational goals and objectives with this HCP:

1. Regulatory and operational certainty for Covered Activities; and
2. Flexibility to choose Conservation Measures that best fit LCRA TSC's business needs.

6.1.2 Biological Goals and Objectives

For the Covered Species, LCRA TSC seeks to achieve the following biological goals and objectives:

- Minimize and mitigate the impacts of incidental take of the Covered Species caused by Covered Activities to the maximum extent practicable by implementing the species-specific Conservation Measures described in this HCP.
- Prioritize approaches for Mitigation that contribute to landscape-scale conservation (such as approved conservation banks, in-lieu fee programs, or other programs or efforts that combine and leverage conservation resources) by providing practicable options for LCRA TSC to fund targeted conservation programs implemented by reliable conservation professionals.

- Maximize the conservation benefit of Mitigation by allocating resources to addressing the threats most relevant to the Covered Species. For example, where the primary threat to a Covered Species is habitat loss from certain types of land uses, allocate Mitigation resources towards protecting more land from those land uses—thereby removing the primary threat—rather than using those resources for management or monitoring activities that may provide only small, incremental conservation value to the Covered Species. In contrast, other Covered Species may benefit most from habitat management, restoration, or enhancement, rather than land protection.
- Contribute to the conservation of the Covered Species by providing Mitigation for Covered Species at levels consistent with the amounts estimated in Table 16 in the unlikely circumstance that LCRA TSC utilized the full extent of the incidental take authorized under the ITP and that certain other circumstances were present. The Mitigation estimates set forth in Table 16 are for illustrative purposes only. LCRA TSC generated these estimates by applying a generalized Applied Mitigation Ratio to the maximum take authorization for each Covered Species (see note regarding these calculations in Table 16). Mitigation is expressed in terms of the number of Conservation Credits that LCRA TSC will purchase or generate (see Chapter 6.5.1). The actual amount of Mitigation LCRA TSC will provide for each Covered Species over the ITP Term will depend on actual enrollments in the HCP and the amount and circumstances of incidental take associated with Covered Activities (see Chapter 6.6.8).

Table 16. Estimated Amount of Mitigation for the Covered Species

Covered Species	Mitigation Estimate*	Covered Species	Mitigation Estimate*
BIRDS		**MAMMALS**	
Golden-cheeked warbler	6,384 credits	Ocelot	165 credits
Whooping crane	447 credits	**INVERTEBRATES**	
Piping plover	11 credits	Comal Springs riffle beetle	1 credit
Rufa red knot	11 credits	Peck's Cave amphipod	1 credit
Red-cockaded woodpecker	270 credits	Bee Creek Cave harvestman	17 credits
AMPHIBIANS		Tooth Cave spider	2 credits
Houston toad	617 credits	Tooth Cave ground beetle	2 credits
Barton Springs salamander	2 credits	Madla Cave meshweaver	2 credits
Georgetown salamander	1 credit	Government Canyon Bat Cave spider	2 credits
Jollyville Plateau salamander	11 credits	Helotes mold beetle	2 credits
Salado Springs salamander	1 credit	*Rhadine exilis*	2 credits
San Marcos salamander	1 credit	*Rhadine infernalis*	2 credits
REPTILES			
Spot-tailed earless lizard	492 credits		

* Mitigation estimates are calculated based on acres of Direct and Indirect Habitat Modification for each Covered Species and species-specific Mitigation Ratios under a "Suitable Habitat with Assumed Occupancy" Enrollment Scenario or, where this Enrollment Scenario is not applicable (as for the aquifer-dependent Covered Species) the "Occupied Habitat with Demonstrated Occupancy" Enrollment Scenario. Calculations also assume an Applied Mitigation Ratio whereby, in addition to the Base Mitigation Ratio, 50% of take is subject to Existing Impacts, 10% of take is subject to Relaxed Restrictions, and 10% of take is subject to Post-Enrollment Mitigation. See Chapter 6.6.8 for detail regarding the assessment of Mitigation for Covered Activities and Appendix D for species-specific Mitigation Ratios. Furthermore, these mitigation estimates are for planning purposes only—the actual amount of Mitigation provided under this HCP will depend on the enrollment of LCRA TSC Activities and the specific circumstances of each Covered Activity.

6.2 CONSIDERATIONS FOR AVOIDING INCIDENTAL TAKE

In general, LCRA TSC operates under the following principles and practices that may reduce the amount of, or completely avoid, incidental take of listed species, including one or more Covered Species:

1. For new transmission lines, LCRA TSC follows the PUC process for performing a comparative routing analysis, which includes consideration of various environmental and land use constraints, to route transmission lines to the extent reasonable in a manner that moderates the impact on the affected community and landowners, unless grid reliability and security dictate otherwise (see Chapter 1.4 for more information on the PUC process).
2. By performing pre-construction natural resource assessments, LCRA TSC avoids adverse effects on sensitive environmental features (including listed species) during project siting and design, where practicable in consideration of the full suite of resources in the human environment and LCRA TSC's obligation to provide reliable utility service to its customers.
3. LCRA TSC voluntarily implements best practices and other measures to reduce environmental impacts before, during, and after construction of a new Facility. LCRA TSC notes many of these standard best practices in its description of the LCRA TSC Activities in Chapter 4.2.

In addition to its general environmental program, LCRA TSC identified voluntary Avoidance Measures for each Covered Species that, if implemented, would avoid incidental take and may contribute to a decision to not enroll LCRA TSC Activities in the HCP (see Appendix D). The ESA does not require ITP applicants or permittees to reduce or avoid incidental take when such take would not jeopardize the continued existence of a listed species (16 USC §1539(a)(2)(B); 16 USC §1536(b)). Under most circumstances, Avoidance Measures are voluntary actions outside of the framework of this HCP.

6.3 HCP ENROLLMENT ALTERNATIVES

6.3.1 Alternate Means of ESA Compliance

Enrolling LCRA TSC Activities in the HCP is voluntary and LCRA TSC may, at its sole discretion, use alternate means of achieving compliance with the ESA for its activities. Such alternate means may include, for example: 1) avoiding take of listed species; 2) obtaining take authorization pursuant to Section 7 of the ESA where LCRA TSC Activities are authorized or funded by a federal agency; 3) participation in another regional HCP or other similar conservation program (such as the Four Utilities HCP); or 4) obtaining a project-specific ITP (like LCRA TSC did for its Competitive Renewable Energy Zone transmission lines). In addition, in some cases, ESA Section 4(d) Special Rules may exempt certain activities from the prohibitions on take.

LCRA TSC may also use one or more of these alternate means of achieving ESA compliance for some of the Covered Species that might be taken by a Covered Activity. For example, a Covered Activity may cross a county that is known to be occupied by three Covered Species. LCRA TSC may decide that it will use the HCP and ITP to authorize incidental take of Covered Species No. 1, but will avoid take of Covered Species No. 2, and will use a different regional HCP for Covered Species No. 3. In such cases, LCRA TSC will document how ESA compliance will be achieved for each Covered Species that occurs near a Covered Activity. LCRA TSC will provide this documentation to the USFWS in the Annual Report.

6.3.2 Participation in Other HCPs

LCRA TSC is a co-permittee or managing partner in two existing, programmatic HCPs with active ITPs:

1. **Four Utilities HCP**—ITP No. TE-78366-0, issued 2005, expires 2035 (unless renewed). The Lower Colorado River Authority (the entity that created LCRA TSC and provides staff for LCRA TSC on a contract basis) is a co-permittee on the ITP for the Four Utilities HCP (SWCA 2005). The Four Utilities HCP plan area and permit area are limited to 142,526 acres within portions of Bastrop and Lee Counties. The Four Utilities HCP covers incidental take of the Houston toad associated with routine business activities related to existing and new linear and fixed-foundation facilities (including, but not limited to electric transmission infrastructure). Lower Colorado River Authority's take authorization under the Utilities HCP is limited to activities occurring on lands associated with 1,203.6 acres of existing facilities and 182.1 acres of new facilities. As of January 2018, LCRA TSC's remaining mitigation credit balance under the Utilities HCP is 86.09 acres (Erik Huebner, LCRA, personal communication to Amanda Aurora, SWCA, on August 2, 2018).
2. **Balcones Canyonlands Conservation Plan (BCCP)**—ITP No. TE-788841, issued 1996, expires 2026 (unless renewed). The Lower Colorado River Authority is a "managing partner" within the BCCP (RECON and USFWS 1996), but is not a co-permittee to the BCCP ITP. The BCCP plan area and permit area are limited to western Travis County, outside of the BCCP preserve acquisition boundary (excepting designated infrastructure corridors). The BCCP covers

incidental take authorization of eight species[12] associated with a variety of land development and land use activities (including electric transmission). The Lower Colorado River Authority's "managing partner" status provides that it may mitigate for capital improvement and infrastructure development projects through the mitigation credit system established by the BCCP, a mitigation process not available to non-partners. As of January 2018, the Lower Colorado River Authority's mitigation credit balance under the BCCP was 261.0 acres (Erik Huebner, LCRA, personal communication to Amanda Aurora, SWCA, on January 5, 2018).

LCRA TSC will also rely on its individual Competitive Renewable Energy Zone Transmission Line HCP (SWCA 2012) and associated ITP (No. TE-46542A) for incidental take authorization related to continued operations and maintenance of the associated Facilities, to the extent applicable. LCRA TSC is not a party to any other programmatic HCPs (including, but not limited to, the regional HCPs serving Williamson County, Hays County, Comal County, and Bexar County and the City of San Antonio).

LCRA intends to use other existing programmatic HCPs when it determines that ESA Section 10 authorization is needed for its LCRA TSC Activities in the following circumstances:

1. **Four Utilities HCP**—LCRA TSC will continue to use the Four Utilities HCP for LCRA TSC Activities that take the Houston toad to the extent that the Four Utilities HCP and associated ITP provide for such coverage and LCRA TSC determines, in consideration of its other business needs, that the Four Utilities HCP and associated ITP is the best compliance option for LCRA TSC Activities.
2. **BCCP**—LCRA TSC will use the programmatic approach of the BCCP for LCRA TSC Activities that occur within the Balcones Canyonlands Preserve or that affect listed karst invertebrates (including listed karst invertebrates that are Covered Species, such as the Tooth Cave spider, Tooth Cave ground beetle, and Bee Creek Cave harvestman) anywhere within the BCCP plan area, to the extent that the BCCP and associated ITP provides for such coverage and is available for use by LCRA TSC. For Covered Species or LCRA TSC Activities that are not able to use the BCCP for ESA compliance, LCRA TSC may use other means of compliance at its discretion, including, but not limited to, this HCP.
3. **Williamson County Regional HCP**—Where LCRA TSC Activities will occur within the plan area for the Williamson County Regional HCP and where ESA compliance with respect to the Bone Cave harvestman (*Texella reyesi*), Inner Space Cavern mold beetle (*Batrisodes texanus*), or Dragonfly Cave mold beetle (*Batrisodes crytotexanus*, if added to the species covered by the Williamson County Regional HCP through implementation of its changed circumstances) can be achieved only pursuant to ESA Section 10, LCRA TSC intends to seek authorization for incidental take of these species through the Williamson County Regional HCP. This is limited to those circumstances where LCRA TSC determines that it cannot avoid incidental take of these listed karst invertebrates and where the Williamson County Regional HCP is available for use by LCRA TSC. LCRA TSC may use this HCP or other applicable alternative to achieve ESA compliance for those listed karst invertebrate species not able to be addressed by the Williamson County Regional HCP.
4. **Southern Edwards Plateau HCP**—Where LCRA TSC Activities will occur within the permit area for the Southern Edwards Plateau HCP and where ESA compliance with respect to listed karst invertebrates can be achieved only pursuant to ESA Section 10, LCRA TSC intends to seek authorization for incidental take of listed karst invertebrates through the Southern Edwards

[12] The BCCP covers incidental take of the golden-cheeked warbler, black-capped vireo, Tooth Cave pseudoscorpion, Tooth Cave spider, Bee Creek Cave harvestman, Bone Cave harvestman, Tooth Cave ground beetle, and Kretschmarr Cave mold beetle. The golden-cheeked warbler, Tooth Cave spider, Tooth Cave ground beetle, and Bee Creek Cave harvestman are Covered Species under this HCP.

Plateau HCP. This is limited to those circumstances where LCRA TSC determines that it cannot avoid incidental take of listed karst invertebrates and where the Southern Edwards Plateau HCP is available for use by LCRA TSC. LCRA TSC may use other applicable alternatives to achieve ESA compliance for those listed karst invertebrate species not able to be addressed by the Southern Edwards Plateau HCP. However, LCRA TSC does not intend for this HCP to cover incidental take of listed karst invertebrates within Bexar County, unless amended in accordance with the provisions in Chapter 8.4.1.

5. **Preserve Lands of Other Programmatic HCPs**— LCRA TSC intends to participate in other programmatic HCPs (including those listed above) in circumstances where the following three criteria are met: 1) LCRA TSC Activities occur within preserve lands established by a programmatic HCP, 2) the other programmatic HCP and its associated ITP provide for coverage of the types of activities sought to be carried out by LCRA TSC, and 3) to the extent such programmatic HCP is available for use by LCRA TSC (i.e., has the requisite number of available participation units).

6.4 IMPLEMENTING MINIMIZATION MEASURES

LCRA TSC will implement measures that minimize the impacts of take caused by its Covered Activities. Some minimization measures generally apply to all Covered Activities and may benefit many or all Covered Species (General Minimization Measures). Other minimization measures are specific to one or more Relevant Covered Species and only implemented in instances where a Covered Activity affects those particular Relevant Covered Species (Specific Minimization Measures).

6.4.1 General Minimization Measures

LCRA TSC will implement General Minimization Measures for all Covered Activities.

1. **HCP Training**—LCRA TSC will provide annual training to its staff and contractors working on Covered Activities regarding the implementation of this HCP. Training will cover the identification of Covered Species and their habitats, key aspects of the biology or ecology of the Covered Species (such as breeding seasons or important behaviors), the anticipated impacts of Covered Activities on the Covered Species, the requirements of this HCP, and what to do if a Covered Species is encountered in the field. Training will be conducted by a qualified LCRA TSC employee or LCRA TSC-employed consultant. LCRA TSC will coordinate such training with the USFWS.
2. **Vegetation Management**—LCRA TSC will clear or manage vegetation within ROWs using aboveground means when practicable. For example, LCRA TSC most often manages vegetation by mowing or shredding above ground portions of the plants, but in certain types of dense vegetation (e.g., in dense mesquite or huisache stands) LCRA TSC may use root grubbing as a more practical and efficient form of vegetation management. Clearing or managing vegetation using aboveground means (e.g., mowing, hydro-ax, manual cutting; as opposed to scraping, grading, and ripping) minimizes subsurface Disturbances and impacts to Covered Species from soil Disturbances. LCRA TSC conducts vegetation management as necessary to create and maintain safe and reliable conditions.
3. **Line Markers**—When Covered Activities involve New Construction or Significant Upgrades, LCRA TSC will mark those sections of transmission lines that cross major rivers and may therefore be preferentially used as movement corridors by certain avian species. When Covered Activities involve New Construction or Significant Upgrades, LCRA TSC will also mark those sections of transmission lines that occur within 1 mile of potential migration stopover habitat for

whooping cranes, limited to Covered Activities that overlap with portions of the Plan Area that occur within the whooping crane "80-mile" migration corridor, and those sections of transmission lines that occur within Critical Habitat for the piping plover (SWCA 2019). Markers will be traditional marker balls, spiral vibration dampeners, air flow spoilers, or similar technologies. LCRA TSC will install markers on the shield wires, with spacing dependent on the type of marker used, and will extend from the river or waterway limits or boundary of the stopover habitat out to a distance of 300 feet. LCRA TSC will inspect and replace markers as necessary as part of routine Operations and Maintenance activities.

4. **Herbicide Use**—LCRA TSC will limit herbicide applications to woody vegetation that is a potential threat to the reliability of LCRA TSC Facilities and will observe USFWS Southwest Region guidance for pesticide applications (USFWS 2007). In addition, LCRA TSC has proposed Specific Minimization Measures limiting herbicide and pesticide use within the habitats of certain Covered Species (see Appendix D). Applicators using mechanized equipment in ROWs will apply herbicides as liquid streams or relatively coarse sprays to minimize spray drift outside of the ROW. LCRA TSC will not apply herbicides when rainfall is likely to occur within 24 hours after treatment. Any use of herbicides will comply with the herbicide label requirements for dilution, application, disposing of rinse water, and disposing of empty containers.
5. **Revegetation**—LCRA TSC will restore preconstruction contours and revegetate construction sites and any other places where soil is disturbed within ROWs. LCRA TSC will revegetate such areas by seeding with a seed mix certified by the U.S. Department of Agriculture and approved by the landowner. To the extent practicable, considering reasonable landowner preferences, LCRA TSC will use seed mixes composed solely of seeds of native plant species. Mulching, matting, and grading may be used as appropriate to local topographic conditions.
6. **Wetland and Aquatic Habitat Avoidance**—To the maximum extent practicable, LCRA TSC will avoid causing subsurface Disturbances to wetlands, riparian areas, and aquatic habitats. Where complete avoidance is not practicable, such as by micrositing Structure locations or spanning crossings, LCRA TSC will minimize such Disturbances to the extent necessary to safely perform the Covered Activity. LCRA TSC will also minimize, to the extent practicable, the removal of woody vegetation from wetlands, riparian areas, and aquatic habitats. However, LCRA TSC may need to remove or trim trees within such areas to ensure the safety and reliability of its Facilities and comply with LCRA TSC's Right-of-Way Management Plan, which follows applicable ANSI, National Electrical Safety Code, and North American Electric Reliability Corporation standards for vegetation management.
7. **Waterway Protection**—LCRA TSC will use E&S controls as required by TCEQ or local ordinances to address storm water discharges during construction. Such installation may require the placement of silt fencing, sediment logs, rock berms, geotextile fabrics, and similar materials within ROWs. These activities also include the maintenance of E&S controls during the construction and post-construction phases. Often, LCRA TSC performs follow-on monitoring of E&S controls after installation to ensure continued functionality and to document that restoration activities are successful.
8. **Known Occurrences of the Covered Species—**LCRA TSC will request from the USFWS information on previously documented locations of the Covered Species. LCRA TSC will make such requests in advance of enrolling LCRA TSC Activities in the HCP during the Annual Coordination Meeting between LCRA TSC and the USFWS (see Chapter 8.2). LCRA TSC will consider any known occurrences of the Covered Species received from the USFWS when planning LCRA TSC Activities.
9. **Occupied or Assumed Occupied Karst Features**—LCRA TSC will avoid making subsurface Disturbances within 50 feet of the entrance or footprint (if known) of a karst feature known or

assumed to be occupied by one or more of the Terrestrial Karst Invertebrates (i.e., an Occupied Karst Feature or an Assumed Occupied Karst Feature; see Glossary for definitions). LCRA TSC will request from USFWS updated information on the locations of known Occupied Karst Features or Assumed Occupied Karst Features during the Annual Coordination Meeting (see Chapter 8.2). LCRA TSC will also minimize, to the extent possible, the removal of woody vegetation from the area within 50 feet of the entrance or footprint (if known) of an Occupied Karst Feature or Assumed Occupied Karst Feature. However, LCRA TSC may need to remove or trim trees within such areas to ensure the safety and reliability of its Facilities and comply with LCRA TSC's Right-of-Way Management Plan, which follows applicable ANSI, National Electrical Safety Code, and North American Electric Reliability Corporation standards for vegetation management. These avoidance measures will only apply to those karst features that the USFWS has not deemed completely taken by other actions, such as karst features subject to impacts within "Impact Zone B" of the Williamson County Regional HCP or "Occupied Cave Zone A" of the Southern Edwards Plateau HCP or similar impacts addressed by an ESA Section 7 interagency consultation.[13]

Through the Annual Coordination Meetings (see Chapter 8.2), LCRA TSC will engage with the USFWS in advance of enrolling any LCRA TSC Activities within 345 feet of the entrance or footprint (if known) of an Occupied Karst Feature or Assumed Occupied Karst Feature, or within designated Critical Habitat for the Terrestrial Karst Invertebrates. In addition to the engagement during the Annual Coordination Meetings, LCRA TSC will submit to the USFWS a brief (i.e., 1 to 2 pages long) description of its proposed Covered Activities within this zone, proposed measures to minimize (to the extent practicable) impacts to the Terrestrial Karst Invertebrates class of Covered Species, and (to the extent known) proposed actions that will generate the requisite Conservation Credits. LCRA TSC will submit this information to the USFWS as early as practicable, but at least 60 days before filing potential routes for new Facilities with the PUC or implementing Covered Activities in this zone, as applicable (see Chapter 8.3 for notification procedures).

USFWS will have the opportunity to review the proposed Covered Activities in this zone and recommend additional measures that may be reasonable and prudent to avoid the likelihood of jeopardizing the continued existence of a Terrestrial Karst Invertebrate species. LCRA TSC expects that USFWS will provide any such recommendations within 30 business days of receipt of the notice. If USFWS does not respond to the notice within 30 business days, LCRA TSC may proceed with the Covered Activities as described in the notice. Where USFWS has made recommendations within 30 business days of receiving notice, LCRA TSC will, to the extent possible (for activities within 50 feet of the feature) or practicable (for activities between 50 and 345 feet of the feature), implement the recommendations of the USFWS or provide a detailed response as to why such recommendations are not possible or practicable, as applicable. These engagement and minimization measures do not apply when impacts to such features associated with the LCRA TSC Activities are authorized through other means, such as participation in another HCP or ESA Section 7 interagency consultation.

10. **Occupied or Assumed Occupied Spring Features** – LCRA TSC will avoid making subsurface Disturbances within 50 feet of a spring outlet or associated spring run or lake or, where applicable, a well with known or assumed occupancy by one or more of the Aquatic Species class of Covered Species (i.e., an Occupied Spring Feature or Assumed Occupied Spring Feature). LCRA TSC will request from the USFWS updated information on the locations of known Occupied Spring Features or Assumed Occupied Spring Features during the Annual Coordination

[13] The Williamson County Regional HCP defines "Impact Zone B" as the area within 50 feet of a species-occupied cave footprint (SWCA et al. 2008). The Southern Edwards Plateau HCP defines "Occupied Cave Zone A" as the area within 345 feet of a species-occupied cave entrance (Bowman Consulting Group et al. 2015).

Meeting (see Chapter 8.2). LCRA will also minimize, to the extent possible, the removal of woody vegetation from the area within 50 feet of an Occupied Spring Feature or Assumed Occupied Spring Feature. However, LCRA TSC may need to remove or trim trees within such areas to ensure the safety and reliability of its Facilities and comply with LCRA TSC's Right-of-Way Management Plan, which follows applicable ANSI, National Electrical Safety Code, and North American Electric Reliability Corporation standards for vegetation management.

Through the Annual Coordination Meetings (see Chapter 8.2), LCRA TSC will engage with the USFWS in advance of enrolling any LCRA TSC Activities within 984 feet of an Occupied Spring Feature or Assumed Occupied Spring Feature. In addition to the engagement during the Annual Coordination Meetings, LCRA TSC will submit to the USFWS a brief (i.e., 1 to 2 pages long) description of its proposed Covered Activities within this zone, proposed measures to minimize (to the extent practicable) impacts to Covered Species in the Aquatic Species group, and (to the extent known) proposed actions that will generate the requisite Conservation Credits. LCRA TSC will submit this information to the USFWS as early as practicable, but at least 60 days before filing potential routes for new Facilities with the PUC or implementing the planned Covered Activities in this zone, as applicable (see Chapter 8.3 for notification procedures).

USFWS will have the opportunity to review the proposed Covered Activities in this zone and recommend additional measures that may be reasonable and prudent to avoid the likelihood of jeopardizing the continued existence of an Aquatic Species. LCRA TSC expects that USFWS will provide any such recommendations within 30 business days of receipt of the notice. If USFWS does not respond to the notice within 30 business days, LCRA TSC may proceed with the Covered Activities. Where USFWS has made recommendations within 30 business days of receiving notice, LCRA TSC will, to the extent possible (for activities within 50 feet of the feature) or practicable (for activities between 50 and 984 feet of the feature), implement the recommendations of the USFWS or provide a detailed response as to why such recommendations are not possible or practicable, as applicable.

These engagement and minimization measures do not apply when impacts to such features associated with the LCRA TSC Activities are authorized through other means, such as participation in another HCP or ESA Section 7 interagency consultation.

11. **Listed and Proposed for Listing Plant Species—**Sixteen federally listed plants occur in portions of the Plan Area that overlap with the ranges of the Covered Species and may be affected by the Covered Activities (see list below). LCRA TSC will request from USFWS information on previously documented locations of these and other federally listed plants and plants proposed for federal listing in the Plan Area. LCRA TSC will make such requests in advance of enrolling LCRA TSC Activities in the HCP during the Annual Coordination Meetings (see Chapter 8.2). LCRA TSC will also request similar information from the Texas Parks and Wildlife Department through a query to the Texas Natural Diversity Database in advance of enrolling LCRA TSC Activities in the HCP.

    LCRA TSC will, to the extent practicable, avoid subsurface Disturbances within 50 feet of any previously documented locality of federally listed or proposed for listing plant species, limited to those localities where continued occupancy by the plant species is likely (i.e., the site retains potentially suitable habitat for the listed plant). To minimize the impact of surface disturbances, LCRA TSC will also, to the extent practicable, implement the measures specified in the list below. If such measures are not practicable, LCRA TSC will provide notice to and engage with the USFWS in advance of enrolling LCRA TSC Activities to identify what other minimization measures, if any, may be reasonable and prudent to avoid the likelihood of jeopardizing the continued existence of the federally listed or proposed for listing plant species. LCRA TSC anticipates that such additional measures would most often include performing surveys to map

the locations of individual plants more precisely and inform more refined micrositing of Disturbances, salvage collection of individual plants from the ROW and relocation to a USFWS-approved site or repository, or avoidance of surface Disturbances during the plant's flowering season.

a. Black lace cactus (*Echinocereus reichenbachii* var *albertii*; federally endangered)—To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include raising mowing heights to no less than 8 inches or deferring Disturbances until outside of the seasonal blooming period for this species (i.e., avoid the period between April and June), and minimizing subsurface Disturbances near waterways.

b. Large-fruited sand verbena (*Abronia macrocarpa*; federally endangered)— To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming period for this species (i.e., avoid the period between February and mid-June).

c. Navasota ladies'-tresses (*Spiranthes parksii*; federally endangered)— To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species, particularly those on protected lands. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include raising mowing heights to no less than 12 inches or deferring Disturbances until outside of the seasonal blooming and seed-set period for this species (i.e., avoid the period between October and December).

d. Neches River rose-mallow (*Hibiscus dasycalyx*; federally threatened)— To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming period for this species (i.e., avoid the period between June and August) and minimizing subsurface Disturbances near waterways and wetlands.

e. Slender rushpea (*Hoffmannseggia tenella*; federally endangered)— To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species.

Such minimization measures may include raising mowing heights to no less than 8 inches or deferring Disturbances until outside of the seasonal blooming period for this species (i.e., avoid the period between April and November).

f. South Texas ambrosia (*Ambrosia cheiranthifolia*; federally endangered)— To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming period for this species (i.e., avoid the period between July and November).

g. Star cactus (*Astrophytum asterias*; federally endangered)— To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include raising mowing heights to no less than 5 inches.

h. Texas ayenia (*Ayenia limitaris*; federally endangered)— To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species, particularly populations on protected lands.

i. Texas golden gladecress (*Leavenworthia texana*; federally endangered)—To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species, particularly monitored populations. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include avoiding the use of herbicides.

j. Texas poppy-mallow (*Callirhoe scabriuscula*; federally endangered)—To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming and seed-set period for this species (i.e., avoid the period between April and June).

k. Texas prairie dawn (*Hymenoxys texana*; federally endangered)—To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species.

l. Texas snowbells (*Styrax texanus*; federally endangered)—To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other

LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species, particularly populations on protected lands.

m. Texas trailing phlox (*Phlox nivalis* ssp *texensis*; federally endangered)—To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include raising mowing heights to no less than 12 inches.

n. Tobusch fishhook cactus (*Sclerocactus brevihamatus* ssp. *tobuschii*; federally endangered)—To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include raising mowing heights to no less than 5 inches.

o. Walker's manioc (*Manihot walkerae*; federally endangered)—To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming period of this species (i.e., avoid the period between April and September).

p. White bladderpod (*Physaria pallida*; federally endangered)—To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming period of this species (i.e., avoid the period between April and May).

6.4.2 Species-specific Minimization Measures

LCRA TSC will, in most circumstances, also implement Specific Minimization Measures for Relevant Covered Species that are associated with a Covered Activity in portions of the ROW that contain Suitable or Occupied Habitat for each Relevant Covered Species (see Appendix D). Specific Minimization Measures include, as applicable, practices such as:

- seasonal or time-of-day restrictions on Direct and/or Indirect Habitat Modifications,
- geographic restrictions on Direct and/or Indirect Habitat Modifications around sensitive breeding sites or other important habitat features,
- use of environmental monitors to ensure proper implementation of certain Specific Minimization Measures,
- oak wilt prevention,

- speed limits on ROWs,
- minimum mowing heights,
- materials and lighting management,
- temporary salvage collection and relocation or release of Covered Species, and
- seed mixes for revegetation.

LCRA TSC will provide a greater level of Mitigation for those Direct and Indirect Habitat Modifications where one or more of the Specific Minimization Measures is not performed (see Relaxed Restrictions Mitigation Factor described in Chapter 6.6.8.2). The Relaxed Restrictions Mitigation Factors are intended to capture the relative importance of Specific Minimization Measures by penalizing the use of the Relaxed Restrictions Mitigation Factor at a level that is comparable to the relative conservation value of the measures. The level of the Relaxed Restrictions Mitigation Factor for each Covered Species is related to the conservation value of the Specific Minimization Measures for that Covered Species (see Appendix D). The intention of the Relaxed Restrictions Mitigation Factors is to allow LCRA TSC the flexibility to fulfill its obligations as a utility provider and incentivize adherence to Specific Minimization Measures by requiring significantly more Mitigation when the conservation value of the Specific Minimization Measures are great, and requiring a moderate amount of additional Mitigation when the Specific Minimization Measures have less conservation value to the Covered Species. Rationale for the Relaxed Restrictions Mitigation Factors for each Covered Species are as follows:

1. **Golden-cheeked Warbler (Plus 100%)** — The Specific Minimization Measures for the golden-cheeked warbler involve strong seasonal restrictions on vegetation clearing and certain construction activities during the species' breeding season, when vulnerable eggs, nestlings, and recent fledglings might be physically present in the vegetation subject to removal. If present, such non-mobile individuals could be directly killed or wounded during clearing activities, representing a loss of individuals and the reproductive output of the nesting adults for that season. Therefore, these seasonal restrictions have a high conservation value to the species and a high Relaxed Restrictions Mitigation Factor.

2. **Whooping Crane (Plus 100%)** — The Specific Minimization Measures for the whooping crane prescribe the use of an environmental monitor during the season when whooping cranes may be present in the Plan Area to temporarily halt Covered Activities when a whooping crane individual is detected near Covered Activities, or to avoid Covered Activities during the wintering season entirely. Due to the relative rarity of this species, the limited availability of wintering habitat, and the territorial nature of wintering whooping cranes (SWCA 2019), these seasonal restrictions have a high conservation value to the species and a high Relaxed Restrictions Mitigation Factor.

3. **Piping Plover and Red Knot (Plus 10%)** — The piping plover and red knot, both threatened species, winter in Texas and may be found in habitats that are used primarily for foraging. For piping plover, at least, the use of specific foraging areas changes by season, weather conditions, and time of day (i.e., affecting tides) (SWCA 2019). While the Specific Minimization Measures for these species include seasonal restrictions on Covered Activities during the period when adult piping plovers and red knots may be present in the Plan Area, the primary threats to these two Covered Species involve impacts to their nesting habitats and key breeding season resources, which are not found in Texas (SWCA 2019). Since, the current status of these species is threatened (not endangered), the primary threats to the species involve impacts to habitat resources not present in the Plan Area, the individuals present in the winter are mobile adults not likely to be directly killed or wounded by Covered Activities, and individuals of these species already shift areas of foraging based on variables like time of day and weather, these seasonal

restrictions have a relatively low conservation value and LCRA TSC has proposed a lower Relaxed Restrictions Mitigation Factor.

4. **Red-cockaded Woodpecker (Plus 100%)** — The Specific Minimization Measures for the red-cockaded woodpecker involve strong seasonal and time-of-day restrictions on vegetation clearing and certain construction activities during the species' breeding season, when in close proximity to Active Clusters. Nesting cavities are valuable resources for red-cockaded woodpeckers, and the species' Recovery Plan identifies insufficient cavities and loss of cavities as the most serious threat to the species (USFWS 2003). The noise and activity disturbances associated with Covered Activities during this sensitive period could threaten the reproductive output of the nesting adults for that season. Therefore, these seasonal restrictions have a high conservation value to the species and a high Relaxed Restrictions Mitigation Factor.

5. **Ocelot (Plus 10%) —** The Specific Minimization Measures for the ocelot involve actions that minimize the risk of collisions with vehicles during the conduct of Covered Activities (i.e., speed limits and day-time operations), as well as measures to reduce disruption of normal behavior (i.e., lighting restrictions and garbage removal). Since LCRA TSC typically performs its Covered Activities during day light hours (even without this restriction) and access roads and ROWs are typically difficult to travel at high speeds, the speed limit, day-time restrictions, and environmental monitor provisions do not add much conservation value for a species that is typically active at night. Furthermore, ocelot presence across potential habitats outside of known breeding populations is only occasional and varied. Therefore, the impact of the lighting and garbage removal measures is also likely low (i.e., most of the time, no ocelots would be present anyway). As set of Specific Minimization Measures has a relatively low conservation value to the species, LCRA TSC has proposed a lower Relaxed Restrictions Mitigation Factor.

6. **Spot-tailed Earless Lizard (Plus 10%) —** The Specific Minimization Measures for the spot-tailed earless lizard involve speed limits to avoid collisions with vehicles and restrictions on the legal application of pesticides or herbicides in or near Suitable or Occupied Habitat. Most access roads associated with LCRA TSC Covered Activities are unimproved and high-speed travel is generally difficult (thereby slowing the pace of travel) even without the restrictions on speed limits. USFWS, in its 90-day finding on a petition to list spot-tailed earless lizard as threatened or endangered, did not find that the petition presented substantial information that legal use of pesticides or herbicides was a threat to the species (SWCA 2019). Therefore, the Specific Minimization Measures for the spot-tailed earless lizard have a relatively low conservation value and LCRA TSC has proposed a lower Relaxed Restrictions Mitigation Factor.

7. **Houston Toad (Plus 100%) —** The Specific Minimization Measures for the Houston toad include robust prescriptions for the use of exclusion fencing, salvage collection/transportation of individuals from ROWs in advance of construction, and biological monitors during construction, among other measures (e.g., seasonal restrictions and speed limits). The exclusion fencing, salvage collection/transportation, and use of biological monitors minimize the risk of a Houston toad individual being directly killed or wounded by Covered Activities. Therefore, this set of measures (in particular) have a high conservation value to the species and warrant a high Relaxed Restrictions Mitigation Factor.

8. **Eurycea Salamanders, Comal Springs Riffle Beetle, and Peck's Cave Amphipod (Plus 100%) —** Water quality, water quantity, and surface habitat modification are threats to these species (SWCA 2019). LCRA TSC proposes Specific Minimization Measures that are designed to address these threats by reducing impacts to water quality and surface habitat caused by Covered Activities. Also, some of these species have special measures for Covered Activities in

Critical Habitat. Due to the limited number of known localities and the importance of water quality to these species, LCRA TSC proposes a relatively high Relaxed Restrictions Mitigation Factor.

9. **Karst Invertebrates (Plus 100%) —** Specific Minimization Measures for the invertebrate Covered Species are designed to reduce the impacts from Covered Activities related to altering surface drainage patterns or introduction of potentially harmful chemicals. Due to the limited number of known localities for these species, LCRA TSC proposes a relatively high Relaxed Restrictions Mitigation Factor.

For example, LCRA TSC may need to perform a Covered Activity during the breeding season of a Relevant Covered Species that has as a Specific Minimization Measure restricting such activity. In those instances, LCRA TSC will compensate for the additional impact of take by providing a greater level of Mitigation (see Chapter 6.6.8.2 and Appendix D). If LCRA TSC elects to forgo the implementation of a particular Specific Minimization Measure, it will still endeavor to implement as many of the other Specific Minimization Measures for that Relevant Covered Species as practicable (i.e., LCRA TSC would still implement oak wilt prevention practices, even if it does not observe the specified seasonal clearing and construction restrictions).

6.5 IMPLEMENTING MITIGATION

6.5.1 Expectations for Mitigation Crediting

6.5.1.1 What is a Conservation Credit?

LCRA TSC will assess and track the implementation of Mitigation for each Covered Species in terms of the number of Conservation Credits generated for that Covered Species. Conservation Credits are specific to a Covered Species or, where Suitable Habitats for more than one Covered Species overlap, a specific group of Covered Species (i.e., stacked mitigation). LCRA TSC will not unstack the individual conservation values of any stacked Conservation Credits when applying the Mitigation to a Covered Activity. Once a unit of habitat is used as Mitigation for one Covered Activity, regardless of the number of Covered Species it supports, it cannot be used as Mitigation a second time.

Typically, Conservation Credits measure Mitigation in terms of the number of acres that are involved in a conservation action, adjusted by the relative conservation value of the action. For the purposes of this HCP, the conservation value of 1 Conservation Credit is generally equivalent to the conservation value of 1 acre of "Protection and Maintenance of Suitable Habitat on New Conservation Lands," as described in the Chapter 6.5.1.2. The relative conservation values of other common types of conservation actions are also provided in Chapter 6.5.1.2. In rare circumstances, non-land-based conservation actions, such as funding research or captive propagation efforts, may also generate Conservation Credit under this HCP, subject to case-by-case approval by the USFWS (see Chapter 6.5.1.2).

6.5.1.2 What Types of Actions Can Generate Conservation Credits?

LCRA TSC will typically implement Mitigation through conservation actions that protect, enhance, restore, create, and/or manage habitat for one or more Covered Species. Such actions can generate Conservation Credit for the applicable Covered Species when approved by the USFWS. In rare circumstances, other types of conservation actions may also generate Conservation Credit (see "Case-by-case Conservation Credit Approvals" in the list below). LCRA TSC anticipates that USFWS will review

and approve all conservation actions implemented under this HCP prior to making an award of an appropriate number of Conservation Credits associated with those actions. However, some Conservation Credit awards will occur outside of the framework of this HCP, such as when USFWS approves and credits a third-party conservation bank or in-lieu fee program. In such cases, LCRA TSC simply purchases previously generated Conservation Credits or funds conservation actions through a USFWS-approved program.

Other Conservation Credit awards will occur as a result of conservation actions performed by LCRA TSC or its representatives (see "Third-party Conservation Providers" in Chapter 6.5.2.3). When LCRA TSC or its representatives perform conservation actions under this HCP to generate Conservation Credits as Mitigation, USFWS will review, approve, and determine the number of Conservation Credits that are generated by such actions. LCRA TSC expects that the USFWS will make crediting decisions for conservation actions performed as Mitigation under this HCP in accordance with its Conservation Banking Guidance (USFWS 2003), to the extent applicable (for instance, see "Case-by-case Conservation Credit Approvals" below for conservation actions that might not be addressed by the Conservation Banking Guidance). LCRA TSC also anticipates that Mitigation performed by LCRA TSC or its representatives under this HCP typically will involve the following types of conservation actions that generate a certain amount of Conservation Credit:

1. **Protection and Maintenance of Suitable Habitat on New Conservation Lands**—This form of Mitigation involves establishing new permanent protections on lands that contain Suitable Habitat with at least some level of documented occupancy for one or more Covered Species (except that the expectation for demonstrated occupancy may be waived by the USFWS on a case-by-case basis; see, for example, the species-specific conservation priorities in Appendix D for the whooping crane). As contemplated by the Conservation Banking Guidance, habitat protection should be paired with sufficient management to "safeguard in perpetuity the conservation values upon which the [Conservation Credits] are based" (USFWS 2003:12). In this scenario, the new conservation lands were previously unencumbered by land use restrictions, and protection in this context means removing threats that may arise from the implementation of land uses that are not compatible with the conservation of the particular Covered Species. Protection may be achieved by fee title acquisition of the land or the acquisition of relevant development rights in the form of a conservation easement or similar legal instrument, with the land or the development rights/conservation easement held by a conservation entity. As stated in the Conservation Banking Guidance, "[a]ll conservation banks will must[sic] have an element of management that will maintain the habitat for the species in the bank" (USFWS 2003:7). Long-term management and monitoring actions will often be necessary to maintain the conservation value of the new conservation lands for the associated Covered Species in perpetuity. LCRA TSC will provide assurances that funding will be available to ensure that all necessary management and monitoring actions can be implemented over the long-term (see Chapter 7.1).

   LCRA TSC anticipates that this form of Mitigation generates 1 Conservation Credit for each acre of Suitable Habitat newly protected and maintained in its baseline condition in perpetuity.

2. **Creation of Suitable Habitat on Existing Conservation Lands**—Previously protected lands (such as parks, preserves, or other forms of dedicated open space that may be protected from development but are not explicitly dedicated as conservation lands for a Covered Species) may include areas that are not currently Suitable Habitat for a Covered Species. However, previously protected lands may offer opportunities for the creation of new acres of Suitable Habitat for a Covered Species. This form of Mitigation also requires sufficient management of the newly created Suitable Habitat to maintain its intended condition, quality, and extent (see Chapter 7.1 for funding assurances associated with Mitigation actions).

LCRA TSC anticipates that this form of Mitigation generates 1 Conservation Credit for each acre of Suitable Habitat created and maintained in perpetuity on previously protected lands. The Conservation Credit for the creation of new Suitable Habitat would become "firm" (i.e., available for use as an offset) upon demonstration that the newly created Suitable Habitat meets the characteristics defined for each Covered Species in Appendix D and is occupied by the species.

3. **Case-by-case Conservation Credit Approvals**—LCRA TSC anticipates that USFWS may grant Conservation Credit for other forms of conservation actions on a case-by-case basis, such as actions that are closely tied to recovery actions identified in species status assessments, recovery plans, 5-year status reviews, or best available science regarding threats to or needs of a species. Other USFWS guidance also identifies other means of generating Conservation Credits, such as the partial credit given to the creation of "buffer areas" in some species-specific mitigation guidance and conservation banking policy (i.e., USFWS 2003, 2013). Except for Conservation Credit awards for the protection of buffer areas (which LCRA TSC expects will typically generate 0.5 Conservation Credit per acre of protected buffer area), LCRA TSC anticipates that requests for case-by-case approvals will be rare and limited to circumstances where practicable habitat-based conservation actions are not available or do not address the most significant conservation needs of the Covered Species.

Subject to other priorities for delivery of Mitigation (see Chapter 6.5.2 that prioritizes the use of USFWS-approved conservation banks and in-lieu fee programs) and species-specific conservation priorities (see Chapter 6.5.3 and Appendix D), LCRA TSC will prioritize conservation actions performed under this HCP in the order of the above list. For example, when implementing its own Mitigation, LCRA TSC will first seek Mitigation options that generate Conservation Credits by the Protection and Maintenance of Suitable Habitat on New Conservation Lands, and only seek USFWS approval for Mitigation associated with Case-by-case Conservation Credit Approvals when other potential credit-generating alternatives are not practicably available.

6.5.2 Delivering Mitigation

LCRA TSC emphasizes that, although conservation and environmental stewardship are important considerations for how LCRA TSC conducts business, LCRA TSC is not a conservation entity and does not intend to have a robust "in-house" program for identifying, acquiring, managing, or monitoring conservation lands for Mitigation. Instead, LCRA TSC will use (when available) off-the-shelf Mitigation options, such as USFWS-approved conservation banks, or it will establish partnerships with conservation entities to implement Mitigation on its behalf. These third-party partnerships may involve non-profit or for-profit Conservation Providers, and LCRA TSC may rely on different partners to implement different Mitigation obligations.

LCRA TSC anticipates delivering Mitigation under this HCP using one or more of the following delivery mechanisms, in order of preference: 1) USFWS-approved conservation banks; 2) USFWS-approved in-lieu fee programs; 3) third-party Conservation Providers implementing USFWS-approved conservation actions; or 4) permittee-implemented USFWS-approved conservation actions. These delivery mechanisms are discussed in more detail below.

6.5.2.1 USFWS-Approved Conservation Banks

6.5.2.1.1 GENERAL CONSIDERATIONS

Conservation banks are third-party, market-driven, mitigation providers that sell pre-packaged Conservation Credits for particular species (or, if stacked, groups of species). Conservation banks go through a rigorous approval process with USFWS, documented in a conservation banking agreement

between the USFWS and the conservation banker. Conservation bankers undertake conservation actions to generate Conservation Credits that become available for purchase by other entities, such as LCRA TSC. LCRA TSC may fully satisfy its Mitigation obligations for a Covered Species upon purchase of the requisite number and type of Conservation Credits from a conservation bank (see Chapter 6.5.2.1.2 for considerations regarding conservation bank service areas).

By purchasing Conservation Credits from a conservation bank in advance of initiating a Covered Activity, LCRA TSC achieves Mitigation in advance of the impact. Under the terms of its conservation banking agreement, the conservation banker accepts all responsibility for the performance of the underlying conservation actions that generated the Conservation Credit.

The purchase of Conservation Credits from a conservation bank is LCRA TSC's preferred method of delivering Mitigation for this HCP. However, the availability of this preferred delivery method is subject to the existence of USFWS-approved conservation banks with an appropriate inventory of available Conservation Credits. LCRA TSC encourages USFWS and conservation bankers to review Table 16 for an estimate of the potential Mitigation needs under this HCP for each Covered Species.

Nothing in this HCP shall prohibit LCRA TSC from establishing its own conservation bank for one or more of the Covered Species.

6.5.2.1.2 SERVICE AREA PRIORITIES AND APPROVALS

USFWS-approved conservation banks have defined service areas into which Conservation Credits may be sold without additional USFWS approval. Conservation Credit sales into a secondary service area or outside of the service area of a conservation bank often require additional USFWS approval. When using conservation banks to deliver Mitigation under this HCP, LCRA TSC will prioritize Conservation Credit purchases from available conservation banks in the following manner:

1. LCRA TSC will use conservation banks with primary service areas that include the location of the Covered Activity; if unavailable, then
2. LCRA TSC will use conservation banks with secondary services areas that include the location of the Covered Activity, with priority given to the conservation bank closest to the location of the Covered Activity; if unavailable, then
3. LCRA TSC will use the closest conservation bank to the location of the Covered Activity, subject to case-by-case approval by USFWS.

By approving this HCP, USFWS authorizes LCRA TSC to purchase Conservation Credits from USFWS-approved conservation banks to mitigate the impacts of take occurring in connection with Covered Activities (including purchases from secondary services areas), in accordance with the order of priority listed above. However, LCRA TSC will seek additional USFWS-approval for the purchase of Conservation Credits from a conservation bank where the service area does not overlap with the location of the Covered Activity.

6.5.2.2 USFWS-approved In-lieu Fee Programs

As used in this HCP, the term "in-lieu fee program" means those circumstances where in-lieu fee providers assume all responsibility for the performance of the Mitigation after receiving payment. By using an in-lieu fee program, LCRA TSC may satisfy its Mitigation obligations for a Covered Species with payment of a specified amount of funds to the in-lieu fee sponsor. The in-lieu fee sponsor coordinates with the USFWS to implement conservation actions that benefit the Covered Species, often by combining funds from multiple entities. All responsibility for ensuring the required Mitigation

measures are completed and successful, including long-term management and maintenance, is transferred from LCRA TSC to the in-lieu fee program sponsor with the transfer of Mitigation funds.

LCRA TSC will calculate in-lieu fee payments for Covered Species as described in Chapter 7.2. These calculations will be based on the number of Conservation Credits specified for a Covered Activity and estimates for generalized costs associated with land protection, management, monitoring, administration, and assurances. Chapter 7.2 sets LCRA TSC's initial estimates for such payments, which will be periodically adjusted to accommodate adaptive management considerations. LCRA TSC will transfer the requisite funds to the in-lieu fee provider in advance of starting the associated Covered Activity, thereby completing its obligations for Mitigation in advance of starting the Covered Activity.

By approving this HCP, USFWS authorizes LCRA TSC to use USFWS-approved in-lieu fee programs for Covered Species, should an applicable program become available, with payments for Mitigation as described above.

6.5.2.3 Third-party Conservation Providers

6.5.2.3.1 GENERAL CONSIDERATIONS

LCRA TSC may contract with third parties to implement Mitigation on its behalf (Conservation Providers). Conservation Providers may include:

- state or local governments or government agencies with a park, preserve, natural area, open space, or other similar conservation land program;
- non-profit land trusts accredited by the Land Trust Accreditation Commission (Land Trust Accreditation Commission 2018, or as may be revised);
- for-profit entities with demonstrated experience implementing USFWS-approved Mitigation projects; and/or
- other conservation providers with programs previously approved by USFWS.

In most cases, LCRA TSC intends that its Conservation Providers will receive funds from LCRA TSC to provide turn-key Mitigation for this HCP, including but not limited to the following services:

- identify and select appropriate conservation opportunities, in coordination with LCRA TSC and USFWS;
- prepare all appropriate site-specific mitigation plans, baseline assessments, species studies, management plans, monitoring plans, and similar studies or reports;
- coordinate with LCRA TSC and USFWS regarding all necessary approvals and crediting of specific conservation actions, in accordance with this HCP;
- generate the appropriate number and type of Conservation Credits required by LCRA TSC;
- maintain the conservation value of Conservation Credits in perpetuity with appropriate management and monitoring activities (in many cases, taking on the liability for maintaining the conservation value from LCRA TSC); and
- prepare and submit documentation of its activities to LCRA TSC.

LCRA TSC will retain responsibility for the generation of the requisite number and type of Conservation Credits associated with its Covered Activities. Conservation Providers may aggregate fees from multiple Covered Activities or funds from other sources to implement conservation actions. In some

circumstances, USFWS may agree that liability for performance of required maintenance, management, and monitoring will shift away from LCRA TSC to the Conservation Provider, such as where the Conservation Provider is in the best position to perform those functions and has provided separate financial assurances. LCRA TSC anticipates that all conservation actions performed by its Conservation Providers will be reviewed and approved by the USFWS prior to generating Conservation Credits. USFWS approval will not be unreasonably withheld if LCRA TSC documents that its proposal is consistent with this HCP.

6.5.2.3.2 SELECTING CONSERVATION PROVIDERS

LCRA TSC may contract with one or more Conservation Providers when it anticipates a need to implement Mitigation. A Conservation Provider will provide to LCRA TSC information on its proposed approach to implementing the requested amount and type of Mitigation in a manner that meets the standards of this HCP. Conservation Provider proposals may be either "programmatic" in nature or may address specific conservation opportunities, depending on the circumstances. LCRA TSC will select Conservation Providers based on such proposals.

LCRA TSC will seek USFWS input on Conservation Provider proposals to help ensure that Conservation Providers are able to deliver Mitigation in accordance with the standards set forth in this HCP. However, LCRA TSC will make any final determinations regarding the selection of Conservation Provider proposals.

6.5.2.3.3 CONSERVATION PROVIDER AGREEMENTS

LCRA TSC may enter into a legally binding agreement with one or more Conservation Provider, based on the selected Conservation Provider's proposal, which specifies how LCRA TSC's Mitigation payment must be used (Conservation Provider Agreement). Conservation Provider Agreements may take different forms, but will include, at a minimum, terms and conditions addressing:

1. the responsibility of the Conservation Provider to perform conservation actions that generate and maintain a specified amount and type of Mitigation, as contemplated in its Conservation Provider proposal;
2. the fees LCRA TSC will provide to the Conservation Provider, including administrative fees (those fees associated with coordinating and documenting the delivery of Mitigation) and Mitigation fees (those fees dedicated to the direct implementation of conservation actions), as applicable;
3. the time periods, including any interim milestones, for implementing Mitigation;
4. the coordination, documentation, and oversight needed to ensure that the Conservation Provider complies with the terms of the Conservation Provider Agreement and this HCP; and
5. provisions for remedying any failure of the Conservation Provider to fulfill its obligations under the Conservation Provider Agreement.

LCRA TSC will submit a draft of each unique form of Conservation Provider Agreement to the USFWS for review prior to execution. Conservation Provider Agreement forms previously approved by USFWS will not require additional review. LCRA TSC will consider any timely comments or suggestions from the USFWS in the final version of the Conservation Provider Agreement, but USFWS approval of Conservation Provider Agreement is not required.

Once a Conservation Provider Agreement is executed with a specific Conservation Provider, LCRA TSC may transfer funds to that Conservation Provider to be used in accordance with the Conservation Provider

Agreement. LCRA TSC will provide Mitigation funds for a Covered Activity to the Conservation Provider in advance of starting the Covered Activity. The Conservation Provider accepts responsibility for using these funds to implement conservation actions for the Relevant Covered Species that meet the standards for Mitigation described herein within a certain period. To the extent the Conservation Provider does not secure Conservation Credits in accordance with the Conservation Provider Agreement prior to LCRA TSC commencing the Covered Activity, LCRA TSC will provide Mitigation funds, and the Conservation Provider must use those funds to secure additional Mitigation in accordance with Chapter 9.1.9 of this HCP, describing the requirements associated with Post-Enrollment Mitigation.

6.5.2.3.4 REMEDYING FAILURE BY A CONSERVATION PROVIDER

Conservation Providers are responsible to LCRA TSC for creating and maintaining a certain number and type of Conservation Credits. However, the creation and maintenance of Mitigation—by any party—is subject to the availability of practicable conservation opportunities and other changed or unforeseen circumstances. Factors influencing the availability and practicability of conservation opportunities may include the existence of landowners with habitats for the Covered Species willing to partner in conservation actions, the cost of acquiring permanent protections for conservation properties, challenges posed by split estates, gaps in the body of best available science to inform effective conservation actions, and other factors.

Conservation Provider Agreements under this HCP will contain measurable criteria for success, including interim milestones to demonstrate progress and provide opportunities to address challenges via adaptive management. Conservation Provider Agreements will also contain obligations for regular coordination with LCRA TSC and others, such as the USFWS or outside advisory groups, as appropriate based on the Conservation Provider proposal. LCRA TSC will, on an annual basis, review the Conservation Provider's activities against the criteria and timelines set forth in the Conservation Provider Agreement and assess the extent to which the criteria are being met. LCRA TSC will report its findings to the USFWS in the Annual Report (see Chapter 8.1 of this HCP), with any recommendations for adaptive management changes.

If a Conservation Provider has failed to meet one or more of its obligations under a Conservation Provider Agreement, including interim milestones, or is at imminent risk of such failure, LCRA TSC will notify the USFWS as soon as practicable. LCRA TSC and the Conservation Provider will implement any applicable terms and conditions of the Conservation Provider Agreement that are intended to address such failures.

To the extent that the Conservation Provider is still not able to generate and maintain the requisite amount of Mitigation for LCRA TSC after exhausting the adaptive management and redress provisions of its Conservation Provider Agreement, then LCRA TSC will confer with USFWS as specified in Changed Circumstances (see Chapter 9.1.7).

6.5.2.4 Permittee-implemented Mitigation

LCRA TSC may elect to perform conservation actions on its own to implement Mitigation in accordance with this HCP. However, LCRA TSC does not anticipate the frequent use of this Mitigation option. LCRA TSC anticipates that permittee-implemented Mitigation projects would satisfy the Mitigation needs for a single Covered Activity or discrete set of similar Covered Activities, such as a set of Operations and Maintenance actions performed in a single year. With permittee-implemented mitigation, LCRA TSC would be responsible for identifying, negotiating, documenting, and implementing USFWS-approved conservation actions to generate needed Conservation Credits, including any appropriate

monitoring and adaptive management, in accordance with the provisions of this HCP (see Chapter 6.5.1.2).

LCRA TSC will assemble a proposal for each permittee-implemented Mitigation project that describes how it will generate the required number of Conservation Credits in accordance with standards for Mitigation established in this HCP (see Chapter 6.5.1.2). LCRA TSC will provide the Mitigation proposal to the USFWS for review and approval before starting the related Covered Activity or Activities. LCRA TSC anticipates that all conservation actions performed as part of a Mitigation proposal will be reviewed and approved by the USFWS prior to generating Conservation Credits. USFWS approval will not be unreasonably withheld if LCRA TSC documents that its proposal is consistent with this HCP.

6.5.3 Species-specific Priorities for Generating Conservation Credit

In Appendix D, LCRA TSC provides additional detail on the specific conservation actions that it expects to pursue when generating Conservation Credits for Covered Species through its Conservation Providers or when performing permittee-implemented Mitigation. This additional detail is species-specific and outlines LCRA TSC's anticipated priorities for pursuing different types of conservation actions and, in some cases, its expectations for crediting of such actions when assessing the relative value of certain case-by-case crediting scenarios. In coordination with USFWS, LCRA TSC will identify and evaluate the available opportunities for generating Conservation Credits at the time it seeks to create or acquire such Conservation Credits in accordance with these priorities and crediting expectations.

6.5.4 Timing and Coordination of Mitigation

Regardless of the type of Mitigation (see Chapter 6.5.1) or the means of delivering Mitigation (see Chapter 6.5.2), LCRA TSC anticipates that Mitigation associated with a Covered Activity will be provided in advance of initiating the Covered Activity (Advance Mitigation).

When LCRA TSC delivers Mitigation by purchasing Conservation Credits from a USFWS-approved conservation bank (see Chapter 6.5.2.1), such purchases will be made in advance of initiating the Covered Activity. When LCRA TSC delivers Mitigation by providing funds to a USFWS-approved in-lieu fee program (see Chapter 6.5.2.2), LCRA TSC will transfer such funds to the in-lieu fee sponsor advance of initiating the Covered Activity. Payments made by LCRA TSC in advance of initiating a Covered Activity to purchase Conservation Credits from a USFWS-approved conservation bank or to fund a USFWS-approved in-lieu fee program qualify as Advance Mitigation under this HCP, since responsibility for implementing the underlying conservation actions is fully transferred to the conservation banker or in-lieu fee sponsor under pre-existing agreements with the USFWS (e.g., executed conservation bank agreements).

When LCRA TSC delivers Mitigation for a Covered Activity using a Conservation Provider (see Chapter 6.5.2.3) or through its own actions (see Chapter 6.5.2.4), LCRA TSC or its Conservation Provider will coordinate with USFWS in advance of LCRA TSC enrolling LCRA TSC Activities in the HCP to ensure that the proposed conservation actions are consistent with the general and species-specific priorities for Mitigation and to ensure that the number of Conservation Credits to be generated by the proposed conservation action will be sufficient to meet the amount specified by Chapter 6.6.8 and Appendix D. LCRA TSC anticipates that such coordination will begin as early as practicable after LCRA TSC identifies LCRA TSC Activities as candidates for future enrollment in the HCP, and that this coordination with USFWS will occur as a part of the Annual Coordination Meeting between LCRA TSC and USFWS (see Chapter 8.2). To the extent practicable, LCRA TSC or its Conservation Providers will implement USFWS-approved conservation actions as Advance Mitigation. In the event that Advance Mitigation to

be provided by LCRA TSC or through a Conservation Provider is not practicable for a Covered Activity, the Changed Circumstance provided in Chapter 9.1.9 will apply.

6.6 EVALUATING COVERED ACTIVITIES

LCRA TSC will follow the process described in this subchapter for evaluating Covered Activities to determine the amount of anticipated incidental take and the amount of Mitigation needed to address the impacts of take on each Relevant Covered Species. Although much of this process incorporates LCRA TSC's current practices for evaluating the environmental impacts of its activities, LCRA TSC is only obligated to implement this process for Covered Activities. LCRA TSC will provide its evaluations of Covered Activities to the USFWS as part of the Annual Report.

6.6.1 Describe the Covered Activity

For each Covered Activity, LCRA TSC will document the class of LCRA TSC Activities involved (i.e., New Construction, Upgrading or Decommissioning, Operations and Maintenance, Emergency Responses, or a combination thereof), location, geographic limits, and anticipated timeframe for completing the Covered Activity. Location information will include, at a minimum, a list of the counties in which the Covered Activity will occur. LCRA TSC will document the geographic limits of the Covered Activity with maps and spatial coordinates.

LCRA TSC anticipates that it may repeatedly perform LCRA TSC Activities, which may involve different classes of LCRA TSC Activities or repeated instances of the same LCRA TSC Activities classes, on the same Facility over the ITP Term. LCRA TSC has the sole discretion to determine which LCRA TSC Activities become Covered Activities. For example, LCRA TSC may decide to enroll a specific New Construction activity in the HCP but may also determine that future Operations and Maintenance of that Facility does not warrant enrollment. LCRA TSC may also decide that Operations and Maintenance of a Facility warrants enrollment in one year, but not at a later date. Therefore, LCRA TSC will describe the anticipated timeframe for the Covered Activity so that the duration of the Covered Activity is clearly described. LCRA TSC also has the sole discretion to determine where the geographic limits of a Covered Activity occur. For example, LCRA TSC may delineate the boundary of a Covered Activity to include only a portion of the ROW associated with a Facility.

6.6.2 Identify Relevant Covered Species

For each Covered Activity, LCRA TSC will identify those Covered Species that might be affected by the Covered Activity, based on the county-level location of the Covered Activity and the known or suspected range and distribution of the Covered Species. LCRA TSC will query the USFWS Information for Planning and Consultation database and the TPWD Rare, Threatened, and Endangered Species of Texas by County (RTEST) online application (or similar databases) to identify those Covered Species with ranges or distributions that may overlap with that of the Covered Activity. LCRA TSC will also consider any information received from USFWS regarding previously documented locations of Covered Species in this review. For each Covered Activity, LCRA TSC will document the list of Covered Species that appear in queries of these or similar sources.

For each Covered Species in this list, LCRA TSC will document how it will achieve ESA compliance related to the Covered Activity. Potential options for ESA compliance may include, as applicable to the Covered Activity and Covered Species: 1) coverage and take authorization under this HCP and ITP; 2) avoiding take of a listed species; 3) receiving take authorization pursuant to Section 7 of the ESA where LCRA TSC Activities are authorized or funded by a federal agency; 4) participation in another regional or

programmatic HCP or other similar conservation program; 5) a project-specific HCP and ITP; or 6) ESA Section 4(d) Special Rule exemption from the prohibitions on take. LCRA TSC will ensure that ESA compliance is achieved for each Covered Species that may be affected by a Covered Activity, by any of the means described above. Chapter 6.3.2 describes LCRA TSC's intentions for using other existing HCPs.

Only those Covered Species for which LCRA TSC desires to use this HCP and associated ITP to authorize incidental take caused by a Covered Activity will be carried forward through the rest of the evaluation process for that Covered Activity. The Covered Species carried forward are the Relevant Covered Species for a Covered Activity.

6.6.3 Delineate Suitable Habitat or Occupied Habitat for Relevant Covered Species

LCRA TSC will delineate the amount and extent of Suitable Habitat or, if desired, Occupied and Unoccupied Habitat for each Relevant Covered Species that is associated with a Covered Activity. Such species-specific delineations will follow the protocols and standards specified in Appendix D. LCRA TSC intends that Suitable Habitat will be a broad delineation of those areas that could be used by a particular Relevant Covered Species. For the purposes of this HCP, LCRA TSC will assume that Suitable Habitat is occupied at some level by the Relevant Covered Species. LCRA TSC intends that most delineations of Suitable Habitat will rely on desktop and/or field investigations of habitat conditions.

LCRA TSC will regularly query the USFWS to obtain the locations of previously documented occurrences of the Covered Species (see Chapter 8.2). LCRA TSC will consider any previously documented occurrences (subject to any time limits on the age of the record, as specified in Appendix D) made available to it by the USFWS when delineating Occupied Habitat, regardless of whether or not LCRA TSC elects to conduct its own Presence/Absence Surveys.

If LCRA TSC opts to perform Presence/Absence Surveys for a Relevant Covered Species, following the protocols specified in Appendix D, then LCRA TSC may use the results of the Presence/Absence Survey to produce a more refined delineation of Occupied Habitat and Unoccupied Habitat for that Relevant Covered Species. Appendix D specifies how LCRA TSC will apply the results of a Presence/Absence Survey to delineate Occupied and Unoccupied Habitat for a Relevant Covered Species. Occupied Habitat represents those portions of Suitable Habitat that have demonstrated occupancy by the Relevant Covered Species. Unoccupied Habitat is Suitable Habitat where Presence/Absence Surveys failed to document occupancy by the Relevant Covered Species. Suitable Habitat not subject to a Presence/Absence Survey or that is not associated with another previously documented occurrence, following the standards in Appendix D, will remain classified as Suitable Habitat.

6.6.4 Delineate Existing Impacts

Covered Activities may occur in areas where existing land uses by LCRA TSC or others generate Existing Impacts that decrease the suitability or quality of Suitable or Occupied Habitat for Relevant Covered Species. Existing Impacts generally apply to any land use or prior disturbance that USFWS typically considers as generating an indirect impact on habitat for a Covered Species in the context of an incidental take assessment. For example, LCRA TSC often seeks opportunities to minimize the environmental impact of New Construction by co-locating new Facilities with existing infrastructure. The existing infrastructure may create a zone of Existing Impacts for a Relevant Covered Species that affects the Suitable or Occupied Habitat associated with the co-located Covered Activity. Similarly, most of LCRA TSC's Upgrading and Decommissioning, Operations and Maintenance, and Emergency

Response activities involve lands that have been previously modified and that may similarly create a zone of Existing Impacts affecting Suitable or Occupied Habitat associated with a Covered Activity.

Notwithstanding the general definition of Existing Impacts, LCRA TSC identified the species-specific conditions that constitute Existing Impacts and the species-specific geographic extent of the zone of Existing Impacts (see Appendix D). LCRA TSC will delineate the extent of Existing Impacts for each Relevant Covered Species associated with a Covered Activity. Modifications of Suitable or Occupied Habitat that is subject to Existing Impacts warrant a lower level of Mitigation (see Chapter 6.6.8.2).

6.6.5 Assess the Extent of Direct and Indirect Habitat Modifications

LCRA TSC will delineate the extent of Direct and Indirect Habitat Modification for each Relevant Covered Species that is associated with a Covered Activity. Direct and Indirect Habitat Modification only apply to areas of Suitable Habitat or Occupied Habitat for a Relevant Covered Species. LCRA TSC will not include Unoccupied Habitat in delineations of Direct or Indirect Habitat Modification.

LCRA TSC will follow the species-specific criteria established in Appendix D for delineating the extent (rounded to the closest 0.1 acre) of Direct and Indirect Habitat Modifications associated with a Covered Activity for each Relevant Covered Species. The combined total acres of Direct and Indirect Habitat Modification for each Relevant Covered Species is the species-specific amount of incidental take associated with the Covered Activity.

LCRA TSC notes that acres of incidental take for different Relevant Covered Species may spatially overlap, such that the implementation of a Covered Activity could modify habitat for more than one Relevant Covered Species at the same time. LCRA TSC may track the extent to which its incidental take assessments for different Relevant Covered Species overlap (i.e., create acres of "stacked" take) and expects that any corresponding Mitigation for the same set of Relevant Covered Species may also be "stacked." LCRA TSC will use a stacked credit only once, even if all the Relevant Covered Species in the stack were not needed for a particular offset.

6.6.6 Determine Application of Specific Minimization Measures

For each Covered Species, LCRA TSC identified a set of Specific Minimization Measures that reduce the impact of incidental take associated with a Covered Activity (see Appendix D). These Specific Minimization Measures are operational adjustments to the implementation of a Covered Activity, such as seasonal restrictions or the use of biological monitors. LCRA TSC anticipates that the application of the Specific Minimization Measures will be standard practice for Covered Activities.

However, from time to time (which LCRA TSC expect to be a rare occurrence), LCRA TSC may require additional flexibility for implementing Covered Activities. LCRA TSC may forego implementation of some or all the Specific Minimization Measures for a Relevant Covered Species as it performs a Covered Activity, in exchange for providing additional Mitigation (see Chapter 6.6.8.2 pertaining to the Relaxed Restrictions Mitigation Factor). LCRA TSC will document prior to implementing a Covered Activity whether it will apply all of the Specific Minimization Measures for a Relevant Covered Species. In cases where LCRA TSC decides to not implement all the Specific Minimization Measures for a Relevant Covered Species (opting instead to provide additional Mitigation), it will nonetheless endeavor to implement as many of these measures as practicable.

6.6.7 Identify Special Cases

To the extent practicable, LCRA TSC will avoid performing Covered Activities in areas that are of particular importance to a Relevant Covered Species (Special Cases). LCRA TSC identifies the Special Cases that are applicable to each Covered Species (see Appendix D). Special Cases may, depending on the Covered Species, address scenarios where Covered Activities occur within areas of Critical Habitat, certain protected conservation areas, or important breeding sites. From time to time, LCRA TSC may need or be required to perform Covered Activities in such areas. LCRA TSC identified Special Cases for many Covered Species where Direct and Indirect Habitat Modifications are likely to have greater impact on that species (see Appendix D). LCRA TSC will provide a greater level of Mitigation for Direct and Indirect Habitat Modifications that occur in areas that represent a Special Case (see Chapter 6.6.8.1).

For Covered Activities involving New Construction, LCRA TSC will observe as Special Cases for each Relevant Covered Species:

1. When affecting the following types of lands:

    a. USFWS-approved conservation bank benefitting one or more of the Covered Species

    b. Land acquired primarily through ESA "non-traditional" section 6 grant funds (e.g., Recovery Land Acquisition or HCP Enhancement)

    c. Land conserved as a result of a USFWS-issued incidental take statement under ESA section 7

    d. Land conserved as mitigation pursuant to a USFWS-issued ITP under ESA section 10(a)(1)(B)

2. Special Cases (requiring higher mitigation) would be triggered only on the types of properties described above and only where all of the criteria below are met:

    a. A conservation easement or other instrument is in place on the subject property;

    b. The conservation easement or other instrument identifies as its primary purpose the conservation of one or more Covered Species;

    c. The conservation easement or other instrument does not contain a provision requiring the landowner or conservation easement holder to replace Covered Species habitat in the event such habitat is lost due to condemnation or acquisition under threat of condemnation;

    d. USFWS has previously determined and/or verified that the subject property is:

        i. Occupied by one or more of the Covered Species; or

        ii. Where occupancy has not been demonstrated, USFWS must have made a previous determination that the property covered by the conservation easement or other instrument provides significant and quantifiable conservation value to the Covered Species; and

    e. The conservation easement or other instrument demonstrating the status of the subject property were in place and disclosed by USFWS to LCRA TSC no later than 30 days

after the date LCRA TSC makes a request for such information to USFWS. If LCRA TSC decides not to pursue the project at any time after one year, such USFWS disclosures will no longer be considered valid.

6.6.8 Assess Mitigation

LCRA TSC will provide Mitigation to address the impacts of incidental take on Relevant Covered Species that occurs in association with a Covered Activity. The amount of Mitigation that LCRA TSC provides is prescribed by the application of species-specific Mitigation Ratios that specify a certain number of Conservation Credits for each acre of Direct or Indirect Habitat Modification (see Appendix D). The Mitigation Ratios applied to a Covered Activity will vary depending on the Enrollment Scenario, as adjusted (up or down) by certain Mitigation Factors, as described in Chapter 6.6.8. This approach achieves the dual operational goals of certainty and flexibility, and the biological goal of providing sufficient Mitigation to address the impacts of incidental take based on the specific circumstances of that take. Therefore, the Mitigation framework described below is a key aspect of the Conservation Program.

6.6.8.1 Enrollment Scenarios and Standard Mitigation Ratios

Below, LCRA TSC defines three possible Enrollment Scenarios, each with a Standard Mitigation Ratio, for its Covered Activities. Standard Mitigation Ratios are the base level of Mitigation for a given Enrollment Scenario.

1. **Suitable Habitat with Assumed Occupancy**—LCRA TSC anticipates that this will be the standard Enrollment Scenario for its Covered Activities since it does not routinely perform Presence/Absence Surveys in advance of its LCRA TSC Activities. LCRA TSC will base its estimate of incidental take on the acres of Suitable Habitat subject to Direct Habitat Modifications and Indirect Habitat Modifications. As described above, LCRA TSC intends that the delineation of Suitable Habitat will broadly capture those areas where a Relevant Covered Species may occur and LCRA TSC will assume that Suitable Habitat is at some level occupied by the Relevant Covered Species. However, this assumption is highly conservative with respect to the Relevant Covered Species and LCRA TSC expects that in most, if not all, circumstances this approach will overestimate the acres of actual Occupied Habitat and the resulting impact on the Relevant Covered Species. Therefore, LCRA TSC takes this likely overestimation into account in proposing Standard Mitigation Ratios towards the lower end of the range of previously approved mitigation levels for a particular Relevant Covered Species for incidental take that occurs under this Enrollment Scenario.
2. **Occupied Habitat based on Presence/Absence Surveys—**LCRA TSC may decide to refine its delineation of Suitable Habitat by applying the results of a Presence/Absence Survey or previously documented detections to establish the limits of Occupied Habitat for a Relevant Covered Species, with the remainder of the Suitable Habitat then considered Unoccupied Habitat for the purposes of this HCP. With this additional biological information, LCRA TSC and the USFWS will have a greater level of precision and reduced uncertainty regarding the amount and extent of incidental take associated with a Covered Activity. Therefore, LCRA TSC proposes greater Standard Mitigation Ratios for incidental take calculated based on Occupied Habitat, where actual incidental take of the Relevant Covered Species is more certain to occur.
3. **Special Cases**—LCRA TSC identified Special Cases for many Covered Species that it believes may result in a disproportionately greater impact on the Covered Species and warrant relatively high Standard Mitigation Ratios (in some cases, much higher).

LCRA TSC will assign the Direct and Indirect Habitat Modifications for a Covered Activity to the applicable Enrollment Scenario for each Relevant Covered Species. For example, most of incidental take of a Relevant Covered Species associated with a Covered Activity may be addressed under the Enrollment Scenario for Suitable Habitat with Assumed Occupancy, except for a relatively small portion of the incidental take that affects Critical Habitat for that Relevant Covered Species (a Special Case). Enrollment Scenarios are species-specific and LCRA TSC will apply the Enrollment Scenarios independently to each Relevant Covered Species.

6.6.8.2 Mitigation Factors and Applied Mitigation Ratios

LCRA TSC will adjust the Standard Mitigation Ratios, where applicable, with the application of certain Mitigation Factors. Mitigation Factors account for other aspects of a Covered Activity that affect the impact of the incidental take on a Relevant Covered Species or the level of certainty surrounding assumptions associated with the Mitigation framework. LCRA TSC expresses Mitigation Factors as a percentage (positive or negative) of the Standard Mitigation Ratio. For example, LCRA TSC will apply a Mitigation Factor that decreases the Standard Mitigation Ratio for those acres of Direct and Indirect Habitat Modification that are subject to Existing Impacts. Similarly, LCRA TSC will apply another Mitigation Factor that increases the Standard Mitigation Ratio for circumstances where LCRA TSC forgoes the application of Specific Minimization Measures such as seasonal clearing restrictions (i.e., Relaxed Restrictions Mitigation Factor). LCRA TSC will apply the applicable Mitigation Factors in tandem. The application of Mitigation Factors may involve only certain acres of Direct and Indirect Habitat Modification associated with a Covered Activity.

The underlying basis for Mitigation Factors relating to Existing Impacts and Relaxed Restrictions are described in prior subsections. However, LCRA TSC also proposes a third Mitigation Factor addressing the additional uncertainty that may arise when conservation actions implementing Mitigation occur after the corresponding Covered Activity has begun (Post-Enrollment Mitigation). LCRA TSC anticipates that the use of Post-Enrollment Mitigation will be a rare Changed Circumstance (see Chapter 9.1.9). To ensure consistency in the application of this Changed Circumstance, LCRA TSC included a Mitigation Factor for Post-Enrollment Mitigation that increases the level of Mitigation over the Standard Mitigation Ratios. While the amount of additional Mitigation prescribed by the Changed Circumstance for Post-Enrollment Mitigation increases by a certain percentage each year that the Mitigation lags behind the incidental take, LCRA TSC will budget for a five-year lag period when planning for Post-Enrollment Mitigation to provide financial assurances for implementing this Changed Circumstance.

In Appendix D, LCRA TSC provides for each Covered Species a matrix of Mitigation Ratios for the different Enrollment Scenarios and Mitigation Factors. See Table 17 for a conceptual example of this matrix. These matrices indicate how LCRA TSC will calculate a comprehensive Applied Mitigation Ratio for each Relevant Covered Species associated with a Covered Activity. For example, LCRA TSC will calculate the Applied Mitigation Ratio for a Relevant Covered Species under each applicable Enrollment Scenario as follows:

> Applied Mitigation Ratio = Standard Mitigation Ratio + [Standard Mitigation Ratio × Existing Impact Mitigation Factor] + [Standard Mitigation Ratio × Relaxed Restrictions Mitigation Factor] + [Standard Mitigation Ratio × Post-Enrollment Mitigation Factor]

Applying the values in Table 17 to a Covered Species where “X” (for Direct Habitat Modification) is 1 and “Y” (for Indirect Habitat Modification) is 0.5, under the Enrollment Scenario for “Occupied Habitat with Demonstrated Occupancy” where all three Mitigation Factors apply, would produce an Applied Mitigation Ratio of 3.5:1 for each acre of Direct Habitat Modification and 1.75:1 for each acre of Indirect Habitat Modification.

For each Covered Activity, LCRA TSC will document Mitigation calculations by completing a worksheet for each Relevant Covered Species that fills in the applicable parts of the mitigation matrix.

Table 17. Conceptual Example of Mitigation Matrix

Enrollment Scenario	Standard Mitigation Ratios	Existing Impact Mitigation Factor	Relaxed Restriction Mitigation Factor	Post-Enrollment Mitigation Factor
Suitable Habitat with Assumed Occupancy	Direct X:1 Indirect Y:1 (assumes a low 'standard' ratio for a relatively broad habitat delineation)	Standard Mitigation Ratio × -50% -0.5X -0.5Y (example cuts the Standard Mitigation Ratio by one-half)	Standard Mitigation Ratio × +100% +1.0X +1.0Y (example doubles the Standard Mitigation Ratio)	Standard Mitigation Ratio × +25% +0.25X +0.25Y (example adds a 25% premium to the Standard Mitigation Ratio)
Occupied Habitat with Demonstrated Occupancy	Direct 2X:1 Indirect 2Y:1 (assumes a somewhat higher ratio applied to a smaller area; impact assessment is more precise)	Standard Mitigation Ratio × -50% -0.5(2X) -0.5(2Y) (example cuts the Standard Mitigation Ratio by one-half)	Standard Mitigation Ratio × +100% +1.0(2X) +1.0(2Y) (example doubles the Standard Mitigation Ratio)	Standard Mitigation Ratio × +25% +0.25(2X) +0.25(2Y) (example adds a 25% premium to the Standard Mitigation Ratio)
Special Cases (for example, Critical Habitat or Key Habitat Type)	Direct 3X:1 Indirect 3Y:1 (assumes a substantially higher ratio to accommodate special circumstances where impacts may be more severe)	Standard Mitigation Ratio × -50% -0.5(3X) -0.5(3Y) (example cuts the Standard Mitigation Ratio by one-half)	Standard Mitigation Ratio × +100% +1.0(3X) +1.0(3Y) (example doubles the Standard Mitigation Ratio)	Standard Mitigation Ratio × +25% +0.25(3X) +0.25(3Y) (example adds a 25% premium to the Standard Mitigation Ratio)

6.7 IMPACTS OF TAKE ARE FULLY OFFSET

USFWS guidance states that "[t]he statutory standard of minimizing and mitigating the impacts of the take "to the maximum extent practicable" under ESA Section 10(a)(2)(B)(ii) will always be met if the HCP applicant demonstrates that the impacts of the taking will be fully offset by the measures incorporated into the plan" (HCP Handbook:9-28). The HCP Handbook describes "fully offset" as meaning "…the biological value that will be lost from covered activities will be fully replaced through implementation of conservation measures with equivalent biological value. Fully offset also means the mitigation is commensurate (equal) with the impacts of taking" (HCP Handbook:9-28). The HCP Handbook (see page 9-30) provides examples of concepts that can help demonstrate how the minimization and mitigation measures of a Conservation Program fully offset the impacts of the taking, such as (paraphrased from the HCP Handbook):

- the ratio of the amount of habitat lost to the amount of habitat protected;
- the type of habitat lost compared to the type of habitat protected;
- the biological value of the habitat lost compared to the biological value of the habitat protected;

- the additional impact, if any, resulting from lag time between the impact of the habitat lost and the full ecological functioning of the protected habitat;

- the impact of uncertainty regarding the effectiveness of minimization and mitigation measures; and

- consistency of the minimization and mitigation measures with previously defined recovery objectives.

In its decision to withdraw previously published ESA compensatory mitigation guidance, the USFWS noted that it "…will make sure that any statutorily authorized mitigation measures will have a clear connection (i.e., have an essential nexus) and be commensurate (i.e., have rough proportionality) to the impact of the project or action under consideration" (83 FR 36470).

A conservative assessment of the impacts of the requested incidental take is provided in Chapter 5.3. Table 15 summarizes these impacts in terms of the proportion of available habitat for each Covered Species that would be directly or indirectly modified (i.e., taken, as measured using the Habitat Surrogate) by Covered Activities. In all cases, the requested incidental take would affect a very small fraction of the total amount of habitat available to each of the Covered Species. Further, this assessment does not incorporate the beneficial aspects of the Conservation Program and therefore represents a potential worst-case scenario of potential impacts where all affected habitat could be completely lost and unmitigated and without the application of basic minimization measures. Even in this potential worst-case scenario, the requested take is less than 0.01% of the available habitat for most Covered Species, and in all cases is less than 0.72% (Table 15). As reviewed in Appendix G, the impacts of the taking, even in this potential worst-case scenario, do not jeopardize the continued existence of the Covered Species or any other listed species or cause the destruction or adverse modification of Critical Habitat.

Moreover, the requested incidental take would not occur without the implementation of the Conservation Program and the minimization and mitigation measures described herein. The practicable minimization and mitigation measures described in Chapter 6, in concert with the funding assurances (Chapter 7) and measures for addressing Changed Circumstances (Chapter 9.1), ensure that the relatively small proportional impacts to the habitats of the Covered Species are fully offset. LCRA TSC describes how the Conservation Program conforms to the considerations identified by USFWS for evaluating "fully offset" when using a Habitat Surrogate:

1. **Mitigation Ratios**—The Standard Mitigation Ratios for Direct Habitat Modification proposed for most Covered Species range from 1:1 to 20:1 (expressed as acres of mitigation to acres of take). These mitigation ratios provide for the permanent protection and management of habitat (or the biological equivalent thereof, see other crediting considerations in Chapter 6.5.1.2 and Appendix D) of the same or greater quantity of habitat that would be directly lost as a consequence of the Covered Activities. The ratios proposed for the Terrestrial Karst Invertebrates provide an exception to this range, such that the smallest Standard Mitigation Ratio for Direct Habitat Modification is 0.25:1 for instances where the required karst feature surveys failed to detect any Occupied or Assumed Occupied Karst Features, which is consistent with other HCPs approved by the USFWS for this set of species (see Appendix D). The Conservation Program also specifies mitigation ratios for Indirect Habitat Modification, a form of impact that generally would not be expected to result in complete habitat loss, that range from 0.1:1 to 2:1 (most commonly, the Standard Mitigation Ratio for Indirect Habitat Modification is 0.5:1). Therefore, the mitigation ratios proposed in this HCP fully offset (or more) the amount of habitat directly lost or partially degraded to the Covered Activities.

2. **Habitat Type**—The Conservation Program defines Suitable Habitat for each Covered Species (see Appendix D) and uses this consistent definition for assessing take and implementing Mitigation. Furthermore, LCRA TSC anticipates that Mitigation in the form of protection and maintenance of Suitable Habitat (which LCRA TSC expects will be the most often used type of conservation action) will involve Suitable Habitat with at least some degree of demonstrated occupancy by the associated Covered Species. For most of the Covered Species, the Suitable Habitats present in the Plan Area either provide all of the life cycle requirements of the species (i.e., the best available science has not demonstrated the existence of different foraging, breeding, sheltering, or seasonal habitats for Terrestrial Karst Invertebrates) or contain only one form of that habitat (i.e., the Plan Area only contains breeding habitat for the golden-cheeked warbler). To the extent that different forms of habitat are relevant to a Covered Species (e.g., red-cockaded woodpecker), the HCP identifies specific considerations for prioritizing in-kind Mitigation (see Appendix D). In this way, the take and Mitigation assessed under this HCP will necessarily involve the same or similar habitat types and facilitate an equal comparison of impact to conservation benefit (i.e., additional consideration is not needed to account for "out-of-kind" Mitigation).

3. **Biological Value**—The Conservation Program contains multiple measures to ensure that the biological value of the Mitigation meets or exceeds the biological value of the habitats subject to Direct or Indirect Habitat Modification.

   The General Minimization Measures (see Chapter 6.4.1) contain a commitment for LCRA TSC to avoid—to the extent *possible*—Direct or Indirect Habitat Modification within 50 feet of the most highly sensitive and biologically valuable areas of habitat for Terrestrial Karst Invertebrates (i.e., the area within 50 feet of a karst feature known to be occupied by one of these species). Furthermore, these General Minimization Measures also commit LCRA TSC to minimize—to the extent *practicable*, and in coordination with the USFWS—Direct or Indirect Habitat Modification within a broader zone adjacent to this highly sensitive habitat. Together, these General Minimization Measures avoid or minimize take associated with the most biologically valuable habitats for the Terrestrial Karst Invertebrates. With respect to Mitigation for the Terrestrial Karst Invertebrates, the HCP specifies a preference for those opportunities that protect and maintain Suitable Habitat, with demonstrated occupancy, in areas that are consistent with the USFWS's recovery objectives (i.e., that contribute to the creation or expansion of karst fauna areas). Similar General Minimization Measures promote the strong avoidance or minimization of impacts to highly sensitive habitats for the Aquatic Species, and LCRA TSC has similarly proposed priorities for Mitigation that focus on the protection and maintenance of those areas contributing to recovery of these species.

   The graduated mitigation ratios associated with different Enrollment Scenarios also ensures that the biological value of the habitats subject to Direct or Indirect Habitat Modification is explicitly considered in the calculation of Mitigation. LCRA TSC has proposed greater mitigation ratios, sometimes significantly greater (as large as 20:1), to compensate for take that involves habitats with demonstrated occupancy by a Covered Species or that involve particularly sensitive habitats (see Enrollment Scenarios described in Chapter 6.6.8.1, and species-specific ratios in Appendix D). These graduated mitigation ratios ensure that the amount of Mitigation associated with a Covered Activity fully offsets the biological value of the affected habitats.

   Similarly, the Existing Impacts Mitigation Factor accounts for the reduced biological value of habitats affected by other pre-existing impacts on the landscape (see Chapter 6.6.5 and Chapter 6.6.8.2). The Existing Impacts Mitigation Factor reduces the amount of Mitigation associated with Direct and Indirect Impacts of a Covered Activity (see Appendix D). However, even with

the biologically appropriate reduction in mitigation ratios associated with this Mitigation Factor, the impacts of the take are fully offset by the totality of the minimization and mitigation measures proposed in the HCP.

4. **Lag Time in Implementing Mitigation**—The HCP relies on Advance Mitigation that ensures there is no lag time in implementing Mitigation associated with Covered Activities, with the rare need for Post-Enrollment Mitigation addressed as a Changed Circumstance. The HCP specifies 25% greater Standard Mitigation Ratios when the Changed Circumstance for Post-Enrollment Mitigation is triggered for a Covered Activity (see Chapter 9.1.9). The Post-Enrollment Mitigation Factor is intended to both discourage the use of Post-Enrollment Mitigation and address any potential impacts associated with delayed implementation of the Mitigation. Since LCRA TSC anticipates that most Mitigation for the Covered Species will be in the form of protection and maintenance of existing areas of Suitable Habitat with at least some level of demonstrated occupancy, LCRA TSC notes that the habitat areas that will be involved in Mitigation actions already exist on the landscape and therefore there would be little if any lag time in the ecological functioning of the protected habitat. Management and monitoring actions will often be necessary to maintain the conservation value of the new conservation lands for the associated Covered Species in perpetuity. For species where the potential availability of practicable opportunities for Mitigation may be the most significant obstacle to implementing Advance Mitigation, the HCP provides sufficient information for third parties to strategically create conservation banks with the USFWS independent of this HCP. LCRA TSC has indicated its preference to use conservation banks, which provide Mitigation in advance of impacts, when possible (see Chapter 6.5.2.1). LCRA TSC also anticipates working with other third-party Conservation Providers that will partner with the USFWS to strategically identify, acquire, and credit Mitigation on LCRA TSC's behalf, which can occur in advance of impacts (see Chapter 6.5.2.3). Therefore, LCRA TSC proposes several measures that ensure any lag time impacts are fully offset.

5. **Addressing Uncertainty**—Uncertainty regarding the application of certain minimization measures and the effectiveness of the Mitigation are addressed by the use of greater mitigation ratios when it is not practicable for LCRA TSC to adhere to all of the proposed Specific Minimization Measures (see Relaxed Restrictions Mitigation Factor in Chapter 6.6.6 and Chapter 6.6.8.2) and in the standards proposed for delivering Mitigation under this HCP (see Chapter 6.5.2).

   With respect to the Relaxed Restrictions Mitigation Factor, LCRA TSC has proposed increasing mitigation ratios by 100% when the Specific Minimization Measures for a particular Covered Species have a strong biological impact (such as seasonal restrictions that are intended to avoid the potential for direct killing or wounding of individuals) and 10% where the Specific Minimization Measures are expected to have a less significant impact on the impact of the taking (see Appendix D). Therefore, the Relaxed Restrictions Mitigation Factor adjusts the amount of Mitigation associated with a Covered Activity in a manner that accounts for both the biological value of the impact and the uncertainty associated with the likely rare or uncommon need to forego certain minimization measures. The additional amount of Mitigation fully offsets the additional impact of Relaxed Restrictions.

   Mitigation under this HCP will be implemented with the coordination and approval of the USFWS and LCRA TSC will provide financial assurances for the implementation of this HCP (see Chapter 6.5 and Chapter 7.3). The HCP also includes Changed Circumstances that address catastrophic natural events that could affect the ecological functioning of prior Mitigation actions.

These coordination, consistency, and funding measures of the HCP ensure that uncertainty is addressed in the delivery of Mitigation that fully offsets the impacts of the taking.

6. **Consistency with Recovery Objectives**—LCRA TSC will provide Mitigation in a manner that is consistent, to the extent practicable and in consideration of relevant site-specific circumstances, with USFWS guidance pertaining to conservation banks (see Chapter 6.5.1). Where case-by-case approval by USFWS is needed to credit alternate forms of Mitigation, LCRA TSC intends that such forms will be based on guidance provided in recovery plan or best available science and will contribute to the recovery of the Covered Species (see Chapter 6.5.3). Therefore, LCRA TSC anticipates that the minimization and mitigation measures of the Conservation Program will fully offset the impacts of the take and contribute to the recovery of the Covered Species.

CHAPTER 7. FUNDING ASSURANCES AND COST ESTIMATES

7.1 FUNDING ASSURANCES

LCRA TSC will provide "… the funding that will be available to implement such steps" (16 USC §1539(a)(2)(A)(ii)) as are specified in this HCP prior to the occurrence of any authorized take associated with a Covered Activity. LCRA TSC has demonstrated its commitment to the conservation of listed species and to partnership with the USFWS through many prior permit and consultation actions, including the Four Utilities HCP (in which LCRA holds the ITP, but LCRA TSC provides much of the funding for mitigation), involvement in the BCCP, and individual HCPs and consultations for specific projects. This history of successful partnership illustrates LCRA TSC's ability to assure that it will fund the implementation of this HCP.

With annual operating revenues of more than $400 million, LCRA TSC is financially capable of ensuring proper implementation of this HCP, including planning, management, and completion of the Conservation Program described in this HCP. LCRA TSC will fund implementation of this HCP, including the Mitigation described in Chapter 6.5, through its existing financial management policies and programs, which include development and approval of annual and long-term business and capital plans that are comprehensive and guide LCRA TSC's financial strategy to fund capital projects and operating costs using a combination of earned revenues and debt financing. These plans will authorize budgets for annual operating and maintenance activities, as well as transmission system capital improvement projects with discrete lifetime budgets that include any funds needed to implement Mitigation for Relevant Covered Species. Such budgets will include, where necessary and appropriate, amounts to establish a management endowment or other secured funding to ensure the protection of mitigation and associated long-term maintenance and monitoring in perpetuity. Many costs associated with implementing this HCP will be borne by LCRA TSC's normal staffing and operations, such as costs for HCP administration, evaluating Covered Activities, and implementing General and Specific Minimization Measures for Relevant Covered Species associated with Covered Activities. This HCP does not include cost estimates for these operational aspects of the HCP, as they are activities that are consistent with or extensions of LCRA TSC's current operations.

LCRA TSC will seek rate recovery for the costs of implementing this HCP through Transmission Cost of Service (TCOS) rate cases and interim TCOS updates before the PUC. For Covered Activities that involve acquisition of a CCN from the PUC (mainly New Construction), LCRA TSC will identify and provide estimated costs of implementing this HCP in the applications for CCNs to the PUC. Generally speaking, Mitigation costs associated with LCRA TSC's capital projects or other reasonable operating and maintenance costs and expenses associated with implementing this HCP are eligible for cost recovery through rates approved by the PUC and paid by consumers of electricity in Texas.

Furthermore, LCRA TSC will require its Conservation Providers to insure or bond the performance of the conservation actions that implement Mitigation on LCRA TSC's behalf, including any management or monitoring obligations. This requirement will be a term or condition of Conservation Provider Agreements and will help ensure that adequate funds will be available to implement Mitigation as intended, and to ensure the long-term maintenance and monitoring of Mitigation, even in the event of Changed Circumstances.

7.2 CONSERVATION CREDIT COST ESTIMATES AND ADJUSTMENTS

Below, LCRA TSC estimates the approximate range of costs for generating a Conservation Credit for each Relevant Covered Species. LCRA TSC bases its Conservation Credit cost estimates on the average per-acre market value of rural land across the real estate markets that coincide with the Plan Area-range of a Relevant Covered Species (see Appendix H and Table 18). LCRA also makes assumptions regarding the use of different means for protecting conservation lands (and the different costs associated with these alternatives) and the costs associated with long-term adaptive management, monitoring, reporting, coordination, and contingencies associated with conservation lands (see Table 18). These assumptions include the following:

- **Land Protection Methods**—25% of the lands needed to support the generation of Conservation Credits will be protected via fee-simple land purchases, 50% will be protected via the purchase of conservation easements, and 25% will involve conservation actions on previously protected conservation lands;

- **Land Protection Costs**—Fee-simple land purchases will be valued at 100% of the average rural land market value, conservation easement purchases will be valued at 50% of the average rural land market value, and conservation actions on previously protected conservation lands will require only minimal additional legal or real estate services estimated at 3% of the average rural land market value;

- **Long-term Obligations**—LCRA TSC approximates the costs of long-term adaptive management, monitoring, reporting, coordination, and contingencies of conservation lands by applying generalized multiplier to the estimated costs for land protection (Long-term Cost Multiplier). LCRA TSC uses a Long-term Cost Multiplier of 2.5× of the Land Protection Cost for each Relevant Covered Species.

Despite the generalized approach to estimating the cost of Conservation Credits for this HCP, recent quotes from existing third-party conservation banks offering Conservation Credits for the golden-cheeked warbler are consistent with LCRA TSC's calculation of estimated Conservation Credit costs in Table 18.[14] None of the other Covered Species are served by an existing third-party conservation bank to enable additional comparisons. However, LCRA TSC acknowledges that there are myriad factors that will influence the actual cost to generate a Conservation Credit for a Relevant Covered Species and that actual costs may be either higher or lower than the estimates provided in Table 18. LCRA TSC will seek competitive pricing for all its Mitigation. In the absence of more specific cost estimates for Mitigation, LCRA TSC will use the estimates in Table 18 for planning purposes.

[14] Jesse McClean, Bandera Corridor Conservation Bank, personal communication to Stephen Van Kampen-Lewis, SWCA, via telephone call on November 30, 2018, quoting an estimated fee of $4,000 per golden-cheeked warbler conservation credit. David Johnston, Hickory Pass Ranch Conservation Bank, personal communication to Stephen Van Kampen-Lewis, SWCA, via telephone on November 30, 2018, quoting an estimated fee range between $5,750 to $6,250 per golden-cheeked warbler conservation credit. Ryan Owings, Resource Environmental Solutions, LLC Festina Lente Conservation Bank, personal communication to Stephen Van Kampen-Lewis, SWCA, via telephone call on December 3, 2018, quoting a fee range between $4,000 to $5,250 per golden-cheeked warbler conservation credit.

Table 18. Estimated Conservation Credit Generation Costs for Relevant Covered Species

Covered Species	Average Rural Land Market Value*	Generalized Land Protection Costs†	Long-term Cost Multiplier	Conservation Credit Cost Estimate
BIRDS				
Golden-cheeked warbler	$3,959	$2,009	2.5	$5,023
Whooping crane	$3,456	$1,754	2.5	$4,385
Piping plover	$4,083	$2,072	2.5	$5,180
Rufa red knot	$4,083	$2,072	2.5	$5,180
Red-cockaded woodpecker	$3,982	$2,021	2.5	$5,052
AMPHIBIANS				
Houston toad	$5,846	$2,967	2.5	$7,417
Barton Springs salamander	$5,804	$2,946	2.5	$7,364
Georgetown salamander	$5,804	$2,946	2.5	$7,364
Jollyville Plateau salamander	$5,804	$2,946	2.5	$7,364
Salado Springs salamander	$2,847	$1,445	2.5	$3,612
San Marcos salamander	$5,804	$2,946	2.5	$7,364
REPTILES				
Spot-tailed earless lizard	$2,429	$1,233	2.5	$3,082
MAMMALS				
Ocelot	$3,186	$1,617	2.5	$4,042
INVERTEBRATES				
Comal Springs riffle beetle	$5,179	$2,628	2.5	$6,571
Peck's Cave amphipod	$4,554	$2,311	2.5	$5,778
Bee Creek Cave harvestman	$6,337	$3,216	2.5	$8,040
Tooth Cave spider	$5,804	$2,946	2.5	$7,364
Tooth Cave ground beetle	$5,804	$2,946	2.5	$7,364
Madla Cave meshweaver	$3,598	$1,826	2.5	$4,565
Government Canyon Bat Cave spider	$3,598	$1,826	2.5	$4,565
Helotes mold beetle	$3,598	$1,826	2.5	$4,565
Rhadine exilis	$3,598	$1,826	2.5	$4,565
Rhadine infernalis	$3,598	$1,826	2.5	$4,565

* Based on the 2016 nominal price per acre for rural land by county, as reported by Texas Real Estate Center (2018) (see Appendix H) and averaged across the Plan Area counties that contain potential habitat for the Covered Species.

† Calculated as: (Average Rural Land Market Value × 25% of area × 100% of value) + (Average Rural Land Market Value × 50% of area × 50% of value) + (Average Rural Land Market Value × 25% of area × 3% of value).

When using a Conservation Provider to implement Mitigation on its behalf, LCRA TSC will, for planning purposes, budget for the generation of the required Conservation Credits based on the Conservation Credit cost estimates in Table 18. For example, if a Covered Activity generates the need for 50 Conservation Credits for the spot-tailed earless lizard, LCRA TSC will either budget $154,100 (i.e., 50

Conservation Credits × $3,082 = $154,100) for the generation of such Conservation Credits or budget for such costs based on a quoted bid from a conservation bank, in-lieu fee program, or Conservation Provider. LCRA TSC will ensure that funds consistent with the Conservation Credit estimates or the actual quotes for Mitigation that LCRA TSC may receive, are available for use by its Conservation Provider prior to the start of the associated Covered Activity.

As an adaptive management measure, LCRA TSC will update the values in Table 18 once every 5 years, providing the updated Table 18 to the USFWS through its Annual Report. The update will address potential changes to the average rural land values (using data and sources like those cited herein) and, if necessary based on experience, to the assumptions for other components of the estimates.

7.3 HCP CONTINGENCY FUNDING

LCRA TSC commits to funding the costs of implementing Mitigation related to Emergency Responses, implementing Changed Circumstances, and other contingencies during the ITP Term (HCP Contingency Funding) by: (1) using the contingency fund for an individual project that includes a Covered Activity; (2) transferring funds within LCRA TSC's annual budget; (3) requesting additional budget approval from the LCRA TSC Board, as necessary, or (4) drawing from LCRA TSC's operating reserve. LCRA TSC's Board Policy T301, Financial Policy requires maintenance of an operating reserve equal to six months of average annual debt service plus two months of average operating and maintenance expenses. As of January 2018, this operating reserve fund totaled more than $79.7 million.

The HCP Contingency Funding is not intended to address contingencies associated with the implementation of Mitigation where LCRA TSC has transferred liability for long-term management, monitoring, and other responsibilities, such as when using conservation banks, in-lieu fee programs, or when Conservation Providers take on such responsibility.

CHAPTER 8. PLAN ADMINISTRATION

8.1 ANNUAL REPORTING

LCRA TSC's fiscal year ends June 30. To correspond with its fiscal calendar, LCRA TSC will provide the USFWS with an Annual Report of HCP-related activities by September 1 of each year (i.e., approximately 60 days following the close of the fiscal year). The Annual Report will document LCRA TSC's compliance with the terms and conditions of the ITP and document other measures performed by LCRA TSC under the HCP. The Annual Report will address activities performed during LCRA TSC's preceding fiscal year (i.e., July 1 through June 30).

The content of the Annual Report will include, but may not be limited to:

1. **Evaluations of Covered Activities**—LCRA TSC will document its evaluation of each Covered Activity by providing information about each step of the evaluation process specified in Chapter 6.6:
    a. The class, location, limits, acres, and anticipated timeframe for completing the Covered Activity (Chapter 6.6.1).
    b. The list of Covered Species that may occur in the counties crossed by the Covered Activity and LCRA TSC's means for achieving ESA compliance for each Covered Species in this county-level list. LCRA TSC will clearly indicate which Covered Species become Relevant Covered Species for the Covered Activity, and which Covered Species will be addressed through alternate means of ESA compliance (Chapter 6.6.2).
    c. The limits and acres of Suitable Habitat or Occupied and Unoccupied Habitat, as applicable, for each Relevant Covered Species associated with the Covered Activity (Chapter 6.6.3). Documentation will include a summary of the acres of Suitable Habitat or Occupied and Unoccupied Habitat associated with the Covered Activity, maps depicting the locations of such areas, and any supporting technical reports (i.e., habitat assessments and/or Presence/Absence Survey reports).
    d. The limits and acres of any Existing Impacts applicable to each Relevant Covered Species for the Covered Activity (Chapter 6.6.4). Documentation will include a brief description of the source of the Existing Impacts, maps depicting the limits of the Existing Impacts and any overlaps with Suitable Habitat or Occupied Habitat for Relevant Covered Species, and the acres of Suitable Habitat or Occupied Habitat for each Relevant Covered Species subject to Existing Impacts.
    e. The total acres of incidental take for each Relevant Covered Species associated with the Covered Activity, as quantified by sum of the acres of Direct Habitat Modification and Indirect Habitat Modification (Chapter 6.6.5). LCRA TSC may also separately report the acres and composition (in terms of the applicable Relevant Covered Species) of acres of stacked incidental take. Documentation will be provided as a summary of the acres of individual and stacked incidental take for each Relevant Covered Species and maps depicting the limits of Direct and Indirect Habitat Modification for each Relevant Covered Species.
    f. The limits and acres of any area of incidental take for a Relevant Covered Species where Specific Minimization Measures will NOT be applied during conduct of the Covered Activity (Chapter 6.6.6). Documentation will include a statement indicating which Specific Minimization Measures will not be applied for a Relevant Covered Species, a

summary of the acres of incidental take for the Relevant Covered Species where Specific Minimization Measures will not be applied, and maps depicting the limits of such areas.

g. The limits and acres of any Special Cases applicable to each Relevant Covered Species for the Covered Activity (Chapter 6.6.7). Documentation will include a statement of the nature of the Special Case, the acres of incidental take subject to the Special Case, and maps depicting the limits of such areas.

h. The amount of Mitigation (in Conservation Credits) for each Relevant Covered Species associated with the Covered Activity (Chapter 6.6.8). Documentation will include a worksheet for each Relevant Covered Species that indicates the acres of incidental take subject to each applicable Enrollment Scenario and Mitigation Factor, calculates the overall Applied Mitigation Ratio for each Relevant Covered Species, and calculates the amount of Mitigation needed for each Relevant Covered Species.

2. **Incidental Take Ledger**—LCRA TSC will document in a ledger (i.e., a filterable spreadsheet, or similar format) all debits from its incidental take allocation for each Covered Species. The incidental take ledger will contain the following information:

   a. The balance of allocated incidental take authorization for each Covered Species.

   b. The amount of incidental take for each Relevant Covered Species debited from the balance for each Covered Activity.

   c. The date an incidental take debit occurred, which will be no later than the start date for the associated Covered Activity.

   d. The revised balance of allocated incidental take authorization for each Covered Species and confirmation that the revised balance is no less than 0 after each transaction.

3. **Mitigation Funding Ledger**—LCRA TSC will document in a ledger (i.e., a filterable spreadsheet, or similar format) the funds allocated to implementing Mitigation for each Relevant Covered Species. The Mitigation funding ledger will contain the following information:

   a. The amount of Mitigation required for each Relevant Covered Species from Covered Activities.

   b. The corresponding amount of funds allocated to implementing the Mitigation. See Chapter 7.2 for estimated costs to generate Conservation Credits and for adaptive management updates to Conservation Credit cost estimates.

   c. The date when the funding for Mitigation was allocated (i.e., the date of a Conservation Credit purchase from a third-party conservation bank, the date of a fund transfer to an in-lieu fee program sponsor, the date of a fund transfer to a Conservation Provider, or similar transactions).

   d. The recipient of the allocated Mitigation funds (i.e., the third-party conservation bank, in-lieu fee program sponsor, Conservation Provider, or LCRA TSC spending on permittee-implemented mitigation).

   e. The date of the start of the associated Covered Activity to document that LCRA TSC allocated funding for Mitigation prior to the start of the Covered Activity.

4. **Documentation of Mitigation Actions**—LCRA TSC will provide to the USFWS documentation of the conservation actions that generate Mitigation under this HCP. The form of such documentation will vary depending on the means of delivering the Mitigation. However, LCRA TSC anticipates that documentation of Mitigation actions will include, but may not be limited to, copies of the following:

a. Documentation of third-party conservation bank service area priorities (see Chapter 6.5.2.1.2) and executed purchase agreements with third-party conservation banks.

b. Executed service agreements with in-lieu fee program sponsors.

c. Executed Conservation Provider Agreements.

d. Conservation Provider reports that contain documentation regarding the selection, assessment, crediting, assurances, and monitoring of specific Mitigation conservation actions against the criteria and timelines set forth in its Conservation Provider Agreement.

e. Adaptive management recommendations for Mitigation.

5. **Progress and Close-out Statements for Covered Activities**—LCRA TSC will provide to USFWS a brief statement for each active Covered Activity that describes the current status of the Covered Activity with respect to the original evaluation of that Covered Activity. Progress statements will identify any changes to the Covered Activity that influence the amount of incidental take and/or Mitigation associated with that Covered Activity. LCRA TSC will also update the Mitigation funding ledger, HCP Contingency Funding ledger, and incidental take ledger accordingly. Upon completion of a Covered Activity and all associated Mitigation (excepting conservation actions for the ongoing management and monitoring of protected lands by LCRA TSC or a Conservation Provider), LCRA TSC will issue a final close-out statement for the Covered Activity.

6. **Updated Conservation Credit Cost Estimates**—Every 5 years following ITP issuance, LCRA TSC will update the Conservation Credit Cost Estimates (see Table 18). LCRA TSC will apply the updated values to any Mitigation funding calculations entered into the Mitigation funding ledger following the close of the fiscal year in which the update occurs. For example, if the ITP is issued on January 1, 2019, the first update of the Conservation Credit cost estimates would be due on January 1, 2024, and would become effective at the start of LCRA TSC's next fiscal year on July 1, 2024. LCRA TSC would provide the updated tables to USFWS with the Annual Report due on September 1, 2024.

7. **Changed Circumstances**—LCRA TSC will document the occurrence of any Changed Circumstances triggered during the reporting year and summarize the actions taken to respond to such Changed Circumstances.

LCRA TSC anticipates creating standardized forms and worksheets for components of the Annual Report to promote consistency and aid review. LCRA TSC will coordinate with the USFWS within the first year of HCP implementation to establish a mutually agreeable format for the Annual Report. LCRA TSC will submit the Annual Report to the USFWS Austin Ecological Services Field Office and the USFWS Region 2 Division of Threatened and Endangered Species in Albuquerque via electronic means, unless otherwise requested by USFWS.

8.2 ANNUAL COORDINATION MEETING

LCRA TSC will request a meeting with the USFWS each year to discuss upcoming LCRA TSC Activities, updated distribution or occurrence information for Covered Species, opportunities for Advance Mitigation, and/or other concerns. LCRA TSC anticipates that the Annual Coordination Meetings will occur in May or June, after the finalization of LCRA TSC's fiscal year business plan and corresponding with the start of LCRA TSC's fiscal year.

8.3 NOTICES

In addition to the Annual Report, LCRA TSC or the USFWS will provide written notice to the other party under certain circumstances. For disputes regarding compliance with the terms and conditions of the ITP or implementation of the HCP, both parties agree to initiate discussions informally with the goal of resolving such disputes without formal engagement under the processes at 50 CFR §13.27-13.28 for ITP suspension or revocation (USFWS and NMFS 2016:17-10).

LCRA TSC will provide written notice to the USFWS Austin Ecological Services Field Office via electronic mail, U.S. Mail, and/or courier service, as appropriate, for:

- initiation of pre-enrollment coordination related to Terrestrial Karst Invertebrates, Aquatic Species, and Listed Plants (see General Minimization Measures #9, #10, and #11 in Chapter 6.4.1), or Post-Enrollment Mitigation (see Chapter 9.1.9);
- requests for Amendments, Renewals, or Transfers to the HCP, ITP, or related documents (see Chapter 8.4); and
- Changed Circumstances, as specified in Chapter 9.1, which trigger additional coordination with the USFWS.

USFWS will provide written notice to LCRA TSC via electronic mail, U.S. Mail, and/or courier service, as appropriate, for:

- requests for Amendments, Renewals, or Transfers to the HCP, ITP, or related documents (see Chapter 8.4);
- the occurrence of Unforeseen Circumstances and any proposals to modify the HCP within the limits of LCRA TSC's No Surprises assurances;
- formal notice of non-compliance with the ITP terms and conditions or provisions of the HCP that indicate the initiation of the ITP suspension or revocation process (50 CFR §13.27-13.28), with any proposals for redress;
- Findings of Necessity, subject to 50 CFR §13.23(b), that an ITP amendment outside of the collaborative process described in Chapter 8.4 is warranted and forthcoming; and
- proposed and final decisions by the USFWS to suspend or revoke the ITP, subject to 50 CFR §13.27-13.28.

Notices to LCRA TSC will be addressed to:

Patti Hershey
Vice President, Environmental Affairs
3700 Lake Austin Boulevard
Austin, Texas 78703
phershey@lcra.org

Notices to USFWS will be addressed to:

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

8.4 AMENDMENTS, RENEWALS, AND TRANSFERS

8.4.1 Amendments

From time to time, LCRA TSC may need to clarify or amend the HCP, ITP, or related documents (e.g., Land Management Plans for permittee-implemented Mitigation). The HCP Handbook contemplates different levels of changes to an HCP, ITP, or its related documents; and a change to one document may or may not require changes to other documents (USFWS and NMFS 2016:17-6). The LCRA TSC and the USFWS must agree in writing to any changes to the HCP and HCP-related documents, such as Land Management Plans. As specified at 50 CFR §12.23(b), the USFWS may make changes to the ITP "for just cause at any time during its term, upon written finding of necessity" without the concurrence of LCRA TSC. However, most changes to the ITP will also require the approval or concurrence of the LCRA TSC. In each case, the USFWS must evaluate each requested change to the HCP, ITP, or related documents in relation to the analyses that supported the original approval of the HCP and issuance of the ITP (i.e., the USFWS's NEPA analysis and ESA Section 7 Biological Opinion).

Based on the guidance in the HCP Handbook, LCRA TSC anticipates three different types of changes to the HCP, ITP, or related documents:

1. **Clarifications**—The HCP Handbook anticipates changes to the HCP, ITP, and related documents, referred to as "Interpretations, Corrections, Clarifications, or Missing Detail," that address "small errors, omissions, or language that may be too general or too specific for practical application" (USFWS and NMFS 2016:17-6). Clarifications are generally administrative and do not change the substance of the HCP, ITP, or related documents. Clarifications do not require additional analysis by USFWS under NEPA or ESA Section 7. For example, changing the date for submittal of the Annual Report or resolving conflicting statements within the HCP or among documents would be changes of this type. Updating the permittee contact information on the ITP is another form of clarification wherein the USFWS would issue a corrected ITP. LCRA TSC or the USFWS may request a clarification of the HCP, ITP, or its related documents in writing to the other party, with an explanation of why the clarification is needed or desired. A clarification is approved with and becomes effective upon the written agreement of both parties. The clarification will be appended to the version of the document to which the clarification applies in both LCRA TSC and USFWS records.
2. **Informal Amendments**—The HCP Handbook anticipates a process for amending the substance of the HCP or related documents via "an exchange of formal correspondence, addenda to the HCP, revisions to the HCP, or permit amendments" (USFWS and NMFS 2016:17-7). In this context, informal amendments are those that implement substantive changes to the HCP or ITP, but do not exceed the scope of the USFWS's original analysis supporting HCP approval and ITP issuance. LCRA TSC anticipates that informal amendments will include those that implement adaptive management measures or responses to Changed Circumstances specified in the approved HCP. LCRA TSC or the USFWS may request in writing the consideration of an informal amendment by the other party, and indicate the specific text to be changed, the proposed new text, the reason for the change, the intended effects of the change, and justification for the change. Notwithstanding LCRA TSC's expectations regarding what types of changes may be processed informally, USFWS will determine if additional public notice, NEPA analysis, or ESA Section 7 analysis is necessary to implement the change. If not, then the change may proceed as an informal amendment. Informal amendments require the written concurrence of both parties to become effective. Although neither party is obligated to approve an informal amendment when LCRA TSC is in compliance with the terms and conditions of its ITP (see the No Surprises assurances in 50 CFR §17.22, §17.32, and §222.2), both the LCRA TSC and USFWS will strive

to not unreasonably withhold such approval. Informal amendments generally result in the issuance of an amended version of the changed document, either in whole or in part, that will replace the prior version in LCRA TSC and USFWS records.

3. **Formal Amendments**—Formal amendments are those substantive changes to the HCP, ITP, or related documents that exceed the scope of the USFWS's original analysis supporting HCP approval and ITP issuance. The HCP Handbook anticipates that formal amendments may be required for certain types of changes to the HCP, ITP, or related documents, including but not limited to (USFWS and NMFS 2016:17-7):
    - addition of new Covered Species, either listed or unlisted;
    - increased level or different form of take for Covered Species;
    - changes to funding that affect the ability of the permittee to implement the HCP;
    - changes to Covered Activities not previously addressed;
    - changes to the Plan Area; and
    - significant changes to the conservation strategy, including substantive changes to Mitigation ratios or standards.

    LCRA TSC or the USFWS may request in writing the consideration of a formal amendment by the other party, and indicate the specific text to be changed, the proposed new text, the reason for the change, the intended effects of the change, and justification for the change. In accordance with the No Surprises assurances (50 CFR §17.22, §17.32, §222.2), LCRA TSC may decline a request by USFWS to consider a formal amendment, if it is in compliance with the terms and conditions of its ITP. However, like an initial application for an ITP, the USFWS must consider all such requests from LCRA TSC. Formal amendments will require the USFWS to consider the change under the same standards and process as a new ITP application, with public notice and comment, NEPA analysis, and ESA Section 7 analysis. However, only those portions of the HCP, ITP, and related documents that are related to the requested change will be subject to such additional review—the formal amendment will not trigger a new review of unrelated and previously approved aspects of these documents. Formal amendments result in the issuance of an amended version of the changed document, either in whole or in part, that will replace the prior version in LCRA TSC and USFWS records.

8.4.2 Permit Term, Renewals, and Suspensions or Revocations

LCRA TSC seeks a renewable ITP from the USFWS with an initial term of 30 years from the date of issuance. LCRA TSC requests that USFWS indicate on the ITP that the ITP is renewable. If LCRA TSC files a request for an ITP renewal 30 days prior to the expiration of the ITP, the ITP will remain valid while the USFWS processes the request (50 CFR §13.22). If LCRA TSC fails to file a renewal request at least 30 days prior to ITP expiration, the ITP will become invalid on the stated expiration date. Any changes to the HCP, ITP, or related documents needed to implement the renewal will be processed in accordance with the provisions described in Chapter 8.4. LCRA TSC anticipates that the USFWS will publicly notice any ITP renewals in the Federal Register for at least 30 days.

8.4.3 Transfers

LCRA TSC may, from time to time, transfer ownership of certain Facilities associated with one or more Covered Activity/Activities to another entity. In circumstances when the new owner wishes to receive the benefits of this HCP and ITP for the transferred Facility and associated Covered Activity, LCRA TSC and the new owner will execute an "Assumption Agreement" that outlines the roles and responsibilities of LCRA TSC, the new owner, and the USFWS, as contemplated in the HCP Handbook (USFWS and

NMFS 2016:17-8). To request a full or partial transfer of the ITP to another entity, the parties will follow the process outlined in Section 17.4.3 of the HCP Handbook, or similar guidance from the USFWS.

CHAPTER 9. NO SURPRISES ASSURANCES

An important incentive for implementing an HCP is the assurances provided by the USFWS's No Surprises rule (63 FR 8859, codified at 50 CFR §17.22, §17.32, §222.2). Under the No Surprises rule, the USFWS assures incidental take permittees that, so long as an approved HCP is being properly implemented, no additional land use restrictions or financial compensation will be required of the permittee with respect to the HCP's Covered Species, even if Unforeseen Circumstances arise after the permit is issued indicating that additional mitigation is needed.

The No Surprises rule recognizes that the permittee and the USFWS 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 specified measures in response to the Changed Circumstances, if and when they occur.

This chapter describes the specific Changed Circumstances anticipated by LCRA TSC and provided for in this HCP, and explains the USFWS's assurances to LCRA TSC with respect to any Unforeseen Circumstances.

9.1 CHANGED CIRCUMSTANCES

USFWS regulations define Changed Circumstances as "changes in circumstances affecting a species or geographic area covered by a conservation plan or agreement that can reasonably be anticipated by plan or agreement developers and the Service [USFWS] and that can be planned for (e.g., the listing of new species, or a fire or other natural catastrophic event in areas prone to such events)" (50 CFR §17.3). To the extent that an ITP permittee provides for a Changed Circumstance in the HCP, the permittee must implement the prescribed response to the Changed Circumstance, if it occurs, to remain eligible for the assurances of the No Surprises rule.

LCRA TSC identifies the following Changed Circumstances that may occur over the ITP Term and the responsive actions required of LCRA TSC to remedy each Changed Circumstance. LCRA TSC is not responsible for addressing Changed Circumstances not provided for in this HCP. Changed Circumstances require written acknowledgement by both LCRA TSC and the USFWS to trigger the responses prescribed below.

9.1.1 Covered Species Collisions with Structures

LCRA TSC implements best practices and other voluntary conservation measures that deter birds from nesting on, colliding with, or being electrocuted by Structures (see Chapter 6.4). Therefore, LCRA TSC does not anticipate that incidental take of Covered Species caused by an individual of these species nesting on, colliding with, or being electrocuted by a Structure is reasonably certain to occur. LCRA TSC has not included its incidental take request from the USFWS authorization for this form of potential incidental take of the Covered Species (see Chapter 5.1). Even so, LCRA TSC cannot completely discount the possibility, albeit low, that a Covered Species may be incidentally taken because of nesting on, colliding with, or being electrocuted by a Structure. SWCA (2019) describes the best available information regarding the threat of these forms of collision-related mortality on Covered Species, where applicable. For example, there is only one documented instance of a whooping crane colliding with a transmission line from the Aransas-Wood Buffalo population, which left the individual injured and unable to be released back to the wild (instead, the individual was added to the captive-breeding population) (Stehn and Wassenich 2008). The USFWS has not identified collision with transmission

lines as a threat to migrating or wintering piping plover (USFWS 2015) or red knot (i.e., transmission lines are not discussed in the final listing rule at 79 Fed. Reg. 73706–73748, nor in USFWS 2019). Therefore, LCRA TSC treats this relatively remote possibility as a Changed Circumstance under the HCP.

In accordance with its Migratory Bird Special Purpose Utility Permit, LCRA TSC will direct its field personnel to document and report any incidental observations of dead or wounded birds, of any species, within ROWs. Incidental observations of dead or wounded birds are those that may occur during other duties, including Covered Activities, within ROWs. LCRA TSC will request that documentation include the date of discovery, a description of the location of the individual or carcass, notes on the condition of the individual or carcass that might help indicate how and when it died or was wounded, and notes on the characteristics (e.g., size, shape, color) of the individual or carcass that might aid in identifying it to species. If possible, such documentation should include photographs and location coordinates. LCRA TSC will direct its field personnel to report observations of wounded birds or bird carcasses to its Environmental Compliance Specialist upon discovery by email or telephone call, to be followed promptly by submittal of the requested documentation within 24 hours.

LCRA TSC will attempt to identify the wounded bird or bird carcass to species or the nearest likely taxon, and assess whether it is a Covered Species. If LCRA TSC determines that the individual or carcass is a Covered Species, then LCRA TSC will informally notify the USFWS by telephone call or email within 24 hours of such confirmation. LCRA TSC will provide written notification to the USFWS of the discovery, with documentation described above, within one week of confirmation following the notice procedures in Chapter 8.3.

LCRA TSC and USFWS will jointly determine whether the wounding or death of the Covered Species is attributable, with reasonable certainty, to the individual nesting on, colliding with, or being electrocuted by a Structure. If the parties are not able to reach agreement that the wounding or death is reasonably certain to have been caused by the individual nesting on, colliding with, or being electrocuted by a Structure, then no further action will be taken and a Changed Circumstance will not have occurred. If LCRA TSC and the USFWS agree that the wounding or death is attributable to the individual nesting on, colliding with, or being electrocuted by a Structure, then the parties will document this determination in writing, thereby triggering this Changed Circumstance.

In response to this Changed Circumstance, LCRA TSC and the USFWS will coordinate to determine what actions are necessary to address the impacts of the collision-associated take. LCRA TSC and USFWS will also coordinate to determine if an amendment to the HCP, ITP, and related documents (as applicable) following the measures described in Chapter 8.4 is warranted. If warranted, the amendment will address the amount of collision-associated take of that Covered Species that is reasonably certain to occur during the remainder of the ITP Term. LCRA TSC may consider adding similar incidental take authorization for other Covered Species as part of this amendment, but is not obligated to do so. LCRA TSC and the USFWS will seek to complete any such amendments within six months of this Changed Circumstance trigger. USFWS agrees that LCRA TSC may continue to rely on the authorizations and assurances of the ITP during the amendment process, like the process associated with ITP renewals.

9.1.2 New Listing or Critical Habitat Designation within the Plan Area

The USFWS occasionally adds new species to the federal list of threatened and endangered species or designates new or revised areas of critical habitat associated with listed species. This Changed Circumstance will have occurred when the USFWS publishes a Proposed Rule in the Federal Register that would create a new listed species that occurs within the Plan Area or that creates or expands areas of

critical habitat within the Plan Area. The USFWS will notify LCRA TSC of the occurrence of this Changed Circumstance.

Within 90 days of notification, LCRA TSC will provide information to the USFWS assessing of the impact of the LCRA TSC Activities on the newly proposed listed species or critical habitat designation. This assessment will follow the format and content of the information provided to the USFWS in the preparation of this HCP. With this assessment, the LCRA TSC will also notify the USFWS if it intends to seek an amendment (following the process in Chapter 8.3) to address the newly listed species or newly designated critical habitat. The USFWS may provide technical guidance to LCRA TSC as it considers whether an amendment is warranted. Regardless of this Changed Circumstance, LCRA TSC reserves the discretion to seek an amendment to add a Covered Species or add conservation measures that avoid the destruction or adverse modification of critical habitat to the HCP, ITP, and related documents. Chapter 8.4.1 addresses the general process and other considerations for such amendments.

9.1.3 Adding a Covered Species

LCRA TSC may seek to amend the HCP, ITP, and related documents to add new species to the list of Covered Species, either because of the Changed Circumstance in Chapter 9.1.2 or for other reasons. A notice from LCRA TSC to USFWS indicating the intent to seek such as amendment will trigger this Changed Circumstance.

Under this Changed Circumstance, the LCRA TSC and USFWS agree to streamline the addition of new Covered Species by adopting, to the maximum extent practicable, the metrics for estimating take and basics of the Conservation Program already specified in the HCP for species that utilize similar ecological niches.

9.1.4 Delisting of a Listed Covered Species or Listed Plant Species

The USFWS may delist a listed Covered Species or a listed plant species subject to General Minimization Measures during the ITP Term due to recovery, extinction, or error. This Changed Circumstance will have occurred when the USFWS publishes a Final Rule in the Federal Register that delists a Covered Species or listed plant species. The USFWS will notify LCRA TSC of the occurrence of this Changed Circumstance.

In response to this Changed Circumstance, USFWS agrees that LCRA TSC may, in its discretion, amend the HCP, ITP, and related documents to remove the delisted species from the list of Covered Species and strike some or all the provisions of these documents that pertain to the delisted species. The USFWS rationale for delisting, as published in the Final Rule, will determine the extent to which LCRA TSC may retire its obligations related to the delisted species through this Changed Circumstance:

- In all delisting cases, LCRA TSC may, in its discretion, amend the HCP, ITP, and related documents to remove obligations to address the delisted species for future Covered Activities.
- In the case of delisting due to recovery, where LCRA TSC's previously completed Mitigation measures contributed to the delisting decision, LCRA TSC will not be relieved of any obligations under this HCP related to those previously completed Mitigation actions without USFWS's expressed consent. This commitment applies only to Mitigation delivered via Conservation Providers or permittee-implemented actions—the actions of third-party conservation banks and in-lieu fee program sponsors are outside of LCRA TSC's control.
- In the case of delisting due to error or extinction, the USFWS will no longer require LCRA TSC to maintain any Mitigation established for the delisted species delivered by a Conservation

Provider or by permittee-implemented actions. LCRA TSC may use any such lands for other purposes, in its discretion, to the extent that the lands do not also support Mitigation for other Covered Species.

USFWS and LCRA TSC agree that changes to the HCP, ITP, and related documents that pertain to delisting of a listed Covered Species or listed plant species may be completed as an informal amendment (as described in Chapter 8.4) without additional public comment, NEPA analysis, or ESA Section 7 analysis. However, USFWS may publish public notice of the amendment on its website and/or in the Federal Register. In some cases, LCRA TSC may prefer to maintain the delisted species as a Covered Species or to continue to implement General Minimization Measures for delisted plant species to protect against future re-listing of the species. If LCRA TSC desires continued coverage of the delisted species, it will request a Clarification from the USFWS that updates the listing status of the delisted species.

9.1.5 Special Rules for Threatened Species

The USFWS may issue a Special Rule for threatened species under Section 4(d) of the ESA that specifies under what circumstances the prohibitions of ESA Section 9 apply to the threatened species. This Changed Circumstance will have occurred when the USFWS issues a Special Rule in the Federal Register for a Covered Species during the ITP Term. The USFWS will notify LCRA TSC of the occurrence of this Changed Circumstance.

In the event of this Changed Circumstance, the USFWS agrees that LCRA TSC may amend the HCP, ITP, and related documents incorporate any applicable provisions of the Special Rule into the HCP. For instance, if the Special Rule exempts certain types of activities from the prohibitions on take and those exempted activities are consistent with aspects of the LCRA TSC Activities, then LCRA TSC will not be obligated to account for take associated with those exempted aspects of the LCRA TSC Activities during HCP implementation.

The Conservation Program of this HCP already contemplates the application of Special Rules when evaluating Covered Activities (see Chapter 6.3.1); therefore, USFWS and LCRA TSC agree that changes to the HCP, ITP, and related documents that pertain to Special Rules for Covered Species may be completed as a clarification (as described in Chapter 8.3) without additional public comment, NEPA analysis, or ESA Section 7 analysis.

9.1.6 Taxonomic Changes

The taxonomic classification of one or more of the Covered Species may change over the ITP Term. It is possible that new science will emerge that indicates one or more of the Covered Species is not a valid taxon or that it belongs to a different taxon. It is also possible that a currently unlisted species that is not a Covered Species will be synonymized with a Covered Species. Such taxonomic changes may alter the known range, distribution, or abundance of a Covered Species in ways that change the impact of incidental take authorized under the LCRA TSC's HCP and ITP, or the assumptions regarding the amount of incidental take that LCRA TSC anticipates from its Covered Activities. Delistings of a listed Covered Species due to taxonomic changes, which would likely be categorized as a delisting due to error, are addressed in Chapter 9.1.4. This Changed Circumstance will have occurred if researchers publish new scientific information involving any Covered Species in a peer-reviewed, scientific journal that changes the taxonomic classification and the USFWS formally accepts the taxonomic change in writing. The USFWS will notify LCRA TSC of the occurrence of this Changed Circumstance.

If this Changed Circumstance occurs, LCRA TSC will coordinate with USFWS to change the HCP, ITP, and related documents using one or more of the processes in Chapter 8.4, as appropriate, to update the

names of the Covered Species, adjust estimates of take as necessary to conform to the new species designations, and clarify how mitigation already in place address the updated taxonomy of the Covered Species. If the taxonomic change does not alter the total amount of take authorized by the HCP and ITP, but merely redistributes the take among different Covered Species, then a Formal Amendment may not be necessary. If the taxonomic change expands the range of a Covered Species in ways not currently evaluated in the HCP, LCRA TSC may coordinate with the USFWS to determine if the revision warrants additional take authorization through a Formal Amendment.

9.1.7 Failure of a Conservation Provider to Deliver Mitigation

LCRA TSC anticipates that its Conservation Providers will provide turn-key services to implement the Mitigation required under this HCP. This includes an expectation that the Conservation Provider will work with LCRA TSC, the USFWS, and other parties as necessary to identify, assess, acquire, manage, and monitor lands that contain Suitable Habitat for Relevant Covered Species, typically in perpetuity. LCRA TSC will require Conservation Providers to insure, bond, or otherwise ensure that it will perform those actions necessary to implement Mitigation in accordance with this HCP. However, it is possible that despite these securities, a Conservation Provider will not be able to fulfill the obligations of its Conservation Provider Agreement. If a Conservation Provider fails to fulfill the obligations of its Conservation Provider Agreement and LCRA TSC and the Conservation Provider are not able to redress the deficiencies (see Chapter 6.5.2.3.4), LCRA TSC will notify the USFWS that this Changed Circumstance has occurred.

In the event of this Changed Circumstance, LCRA TSC and USFWS will meet and confer as soon as practicable following notification regarding alternate, practicable, and mutually agreeable means of meeting its Mitigation obligations. Such alternatives could include choosing a new Conservation Provider better able to implement the conservation actions required under the relevant Conservation Provider Agreement. LCRA TSC will apply any surrendered bond or insurance payments to fulfill the original Mitigation obligation to the extent practicable, including any additional Mitigation that may be triggered by a Post-Enrollment Mitigation scenario (see Chapter 9.1.9), in coordination with the USFWS.

9.1.8 Catastrophic Natural Events

Catastrophic natural events such as wild fires, tornadoes, floods, outbreaks of tree diseases (e.g., oak wilt), prolonged periods of severe drought, and similar events could temporarily (i.e., where the adverse effects would be expected to last for a period of no more than approximately 15 years) reduce or degrade Suitable Habitat for the Covered Species within protected lands that generate Mitigation for this HCP. Many of these acute and catastrophic events are a normal or at least occasional occurrence, particularly at wildland-urban interfaces. If such an event occurs on LCRA TSC-responsible protected lands (i.e., not those associated with third-party conservation banks or in-lieu fee programs), the USFWS may require LCRA TSC to reallocate funding for the management and monitoring of such lands to restoration efforts. When LCRA TSC has provided for the permanent protection of Suitable Habitat and established funding assurances through an endowment or other appropriate secured funding mechanism approved by USFWS, for the perpetual management and monitoring of protected Suitable Habitat, under no circumstance will such adaptive management responses require the acquisition or management of additional mitigation lands or funds outside that anticipated for management and monitoring in Chapter 7. The USFWS will not withhold access to Conservation Credits that have been awarded with the approval of USFWS, but not applied to a Covered Activity, as long as LCRA TSC is otherwise in compliance with the terms and conditions of the ITP and continues to conduct restoration activities to the extent allocated funding permits.

9.1.9 Post-Enrollment Mitigation

In rare cases, it may not be practicable or even possible for LCRA TSC or its Conservation Providers to implement Advance Mitigation. In such cases, the conservation actions needed to generate the requisite type and number of Conservation Credits for a Covered Activity would occur after the Covered Activity has begun (Post-Enrollment Mitigation). LCRA TSC anticipates that Post-Enrollment Mitigation will be rare given its commitment to substantial upfront coordination with the USFWS (see Chapter 8.2) and the flexibility built into the HCP for the USFWS to award Conservation Credit for a wide variety of potential conservation actions (see Chapter 6.5.1.2). Post-Enrollment Mitigation will necessarily accompany any Covered Activity that involves Emergency Responses, since LCRA TSC cannot foresee precisely when or where these types of Covered Activities may occur. Post-Enrollment Mitigation may also occur in the unexpected circumstance that a conservation opportunity sufficient to win USFWS approval and crediting is not practicably available, yet the Covered Activity cannot be delayed. There may be other circumstances in which provision of Advance Mitigation is not practicable or possible.

Specifically, this Changed Circumstance is triggered where LCRA TSC is unable to implement Advance Mitigation for a Covered Species that may be affected by specific Covered Activities after exhausting all opportunities to generate the specified number and type of Conservation Credits in a manner that is consistent with the standards and process described in Chapter 6.5 and Appendix D and any other applicable Changed Circumstances (e.g., Chapter 9.1.7). LCRA TSC will notify the USFWS as early as practicable using the provisions in Chapter 8.3 when it foresees a need for Post-Enrollment Mitigation. In the notice, LCRA TSC will explain why Post-Enrollment Mitigation is anticipated for the Covered Activity, including all steps taken to identify and/or attempt to secure Advance Mitigation.

Consistent with USFWS guidance contained in the HCP Handbook (see HCP Handbook chapter 9.4.9—Timing of Mitigation), LCRA TSC will implement the following measures in response to this Changed Circumstance:

1. **Establish Timelines for Implementing Post-Enrollment Mitigation**—The HCP Handbook indicates that an HCP "must provide a clear timeline for implementing the mitigation" (HCP Handbook:9-27). LCRA TSC will establish practicable timelines for implementing any Post-Enrollment Mitigation associated with a Covered Activity. For example, LCRA TSC will include in its Conservation Provider Agreements (which are subject to USFWS review and approval, see Chapter 6.5.2.3.3) specific timelines for implementing any Post-Enrollment Mitigation and obligate its Conservation Providers to abide by such timelines (see Chapter 6.5.2.3.4 for provisions to remedy failures of its Conservation Providers to meet contractual obligations). LCRA TSC will also include timeline information in any mitigation proposals submitted to USFWS for review and approval related to permittee-implemented mitigation. These timelines will include, as applicable, interim progress milestones and final completion dates. These timelines may vary depending on the circumstances of the Covered Activity, the Relevant Covered Species, or proposed method of delivering the Mitigation. However, in most cases, LCRA TSC expects that Post-Enrollment Mitigation will be implemented within 5 years of the start of the associated Covered Activity.

- **Offset Additional Impacts Associated with Mitigation Time Lags**—The HCP Handbook notes that "the lag time between impacts and offset can result in additional impacts to the species which can affect the amount of mitigation needed to fully offset impacts and may affect the survival of the species at the site… In these cases, we must determine the type and level of additional impacts that would occur during the time lag and ensure that the proposed mitigation would also offset those impacts" (HCP Handbook:9-27). To illustrate this concept, the HCP Handbook includes a hypothetical example involving to a conservation action that protects and restores

presumably degraded or non-functioning potential breeding habitat, where the conservation value of the action (i.e., the ability for the species to successfully breed in the restored habitat) is not fully realized for a period of two years, creating loss of recruitment for two years in the protected habitat area (HCP Handbook:9-27).

Unlike the example provided in the HCP Handbook, LCRA TSC anticipates that most (if not all) Mitigation for the Covered Species will be in the form of protection and maintenance of existing areas of Suitable Habitat that have demonstrated occupancy (see Chapter 6.5.1.2). Furthermore, USFWS is expected to only approve conservation actions for Mitigation that are consistent, to the extent applicable, with its Conservation Banking Guidance (USFWS 2003). Therefore, the occupied Suitable Habitat areas that will be involved this type of Mitigation action will already exist on the landscape in a condition that supports the conservation of the Covered Species at the time the Covered Activity begins (i.e., there is no lag in conservation value as the habitat is already present and occupied, even if it is not immediately protected and actively maintained). This type of circumstance is different than the example provided in the HCP Handbook that illustrates when a lag in the timing of mitigation can create an additional impact to the species.

For this HCP, the timing of the execution of legal instruments that protect against future changes to lands used in Mitigation actions is not likely to have much, if any effect, on the ecological functioning of the Suitable Habitat that is ultimately protected—particularly given relatively short timeline for implementing Post-Enrollment Mitigation (i.e., 5 years). For example, the golden-cheeked warbler uses habitat that is typically described as a climax or old-growth forest community, such that once suitable habitat conditions are achieved, very little active management is needed to preserve the conditions that support the species. In this example, the habitat areas ultimately included in the protected area are not likely to "grow out of" suitability in the absence of active management or monitoring in a 5-year period, such that the golden-cheeked warbler experiences a temporal loss in habitat availability due to the delayed protection and maintenance of the conservation area. Suitable habitats for most (if not all) of the other Covered Species (e.g., karst invertebrates, *Eurycea* salamanders, red-cockaded woodpeckers, whooping cranes) are similarly "stable" on the landscape and not likely to substantially change due to natural succession over a potential lag period of 5 years.

There is a potential, however, for the number of practicable conservation opportunities that are available for protection and maintenance to change over a lag period of 5 years. In the context of this HCP where LCRA TSC will have made every effort to achieve Advance Mitigation in coordination with USFWS, the need to invoke Post-Enrollment Mitigation via this Changed Circumstance will have meant that there were no practicable conservation opportunities meeting USFWS approval available for implementation in advance of the Covered Activity. Therefore, the time lag could have a beneficial effect by providing additional time to identify, negotiate, and implement USFWS-approved conservation actions. If there were no practicable conservation opportunities in advance of the Covered Activity and no practicable conservation opportunities at the end of the time lag, then the time lag would have had no effect, particularly when Mitigation is in the form of protection and maintenance of existing and occupied Suitable Habitat.

With respect to the purchase power of the conservation dollars allocated by LCRA TSC in advance of implementing a Covered Activity (i.e., see Chapter 6.5.2.3 and Chapter 6.5.2.4 regarding the timing of funding conservation actions), it is possible that a delay in acquiring lands for Mitigation could cause the purchase power of any allocated funds to decrease due to inflation of land values or other costs. Therefore, when using Post-Enrollment Mitigation, LCRA TSC will increase the amount of Conservation Credits or other Mitigation associated with a Covered Activity by 5% each year that implementation is delayed. This amount is roughly equivalent to

the state-wide rise in rural land values between 2016 and 2017 (i.e., 4.46%) (American Society of Farm Managers and Rural Appraisers 2017).

- **Funding Assurances for Post-Enrollment Mitigation**—The HCP Handbook states that "If the HCP's mitigation cannot be implemented until after impacts, the applicant needs to include acceptable instruments in the HCP for ensuring implementation of the mitigation, such as bonds, letters of credit, or similar funding assurances." LCRA TSC will budget for Mitigation associated with Covered Activities based on the evaluation process described in Chapter 6.6 (in particular, Chapter 6.6.8 for the assessment of Mitigation) and the cost estimates for generating Conservation Credits described in Chapter 7.2. LCRA TSC will transfer funding for implementing Mitigation to in-lieu fee providers or its third-party Conservation Providers in advance of starting a Covered Activity, including in circumstances where Post-Enrollment Mitigation is anticipated (see Chapter 6.5.2.2 and Chapter 6.5.2.3.2). LCRA TSC provides additional funding assurances as described in Chapter 7.1, including rate recovery, requiring its Conservation Providers to insure or bond performance, and identifying HCP Contingency Funding (see Chapter 7.3).

In the unlikely event that no practicable opportunities exist for carrying out Mitigation obligations in connection with a Covered Activity, LCRA TSC will work with USFWS to identify other types of practicable Mitigation solutions for the Relevant Covered Species, which may include, but are not limited to:

- Approval of alternate means of Mitigation delivery, such as translocating or repatriating Relevant Covered Species, enhancement of functional habitat for Relevant Covered Species, or restoration of degraded habitat for Relevant Covered Species.
- Approval of methods to reduce or eliminate other threats to the Relevant Covered Species.
- Funding for research or studies regarding the Relevant Covered Species that further scientific understanding of how to manage and conserve those species.

The USFWS in coordination with LCRA TSC will determine the conservation value of such alternate measures (i.e., equivalent number of Conservation Credits) in accordance with the crediting standards set forth in Chapter 6.5.1.2, and LCRA TSC commits to delivering such alternate means of Mitigation.

9.2 UNFORESEEN CIRCUMSTANCES

Unforeseen Circumstances are changes in circumstances affecting a species or geographic area covered by an HCP that could not reasonably have been anticipated by the ITP applicant and the USFWS at the time of the HCP's development, and that result in a substantial and adverse change in the status of any Covered Species (50 CFR §17.3). The USFWS will have the burden of demonstrating that Unforeseen Circumstances exist and must base the determination on the best scientific and commercial data available. The USFWS shall notify LCRA TSC in writing of any Unforeseen Circumstances the USFWS believes to exist.

The No Surprises rule states that the USFWS may require additional conservation measures of an incidental take permittee because 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." 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 plan, permit, and other supporting documents, as applicable.

CHAPTER 10. ALTERNATIVES CONSIDERED

Section 10(a)(2)(A) of the ESA requires that HCPs include a description of the "alternative actions to such taking the Applicant considered and the reasons why such alternatives are not being utilized." The following sections discuss the alternatives to this HCP considered by LCRA TSC.

10.1 NO PROGRAMMATIC HCP ALTERNATIVE

Under the No Programmatic HCP Alternative, LCRA TSC would neither seek a programmatic ITP nor implement the programmatic HCP. Instead, LCRA TSC would comply with the ESA on a project-by-project basis. Prior to initiating a project, LCRA TSC would review its activities to determine if the activity is likely to result in incidental take of a listed species. If incidental take is likely, LCRA TSC would either modify the activity to avoid the reasonable certainty of take or seek authorization for such take.

Preparation of individual-project HCPs and the associated NEPA documents that may be necessary to achieve ESA compliance for independent projects may require an extensive time and financial commitment on behalf of LCRA TSC. LCRA TSC estimates that for each project, the planning and administrative costs involved in obtaining an ITP may cost LCRA TSC between $100,000 and $600,000, depending on the scope and unique circumstances associated with that project. This estimate does not include the additional cost of any necessary Mitigation. With a programmatic HCP, LCRA TSC incurs these administrative expenses once for the entire set of Covered Activities. Just as critical to LCRA TSC's operations, developing the necessary documentation for project-specific ITPs would require as many as 2 to 5 years for each covered activity, significantly lengthening the process for delivering necessary public infrastructure and services.

With project-specific HCPs, LCRA TSC would still be required to complete the same number of projects over the 30-year ITP Term. Without a programmatic HCP, LCRA TSC and PUC may use project-specific routing to reduce effects on the Covered Species, but these routing decisions may also result in significantly higher project budgets that place an unjustifiable economic burden on LCRA TSC and their customers. Project-specific HCPs would consider the impacts associated with isolated instances of incidental take and would not provide the same large-scale analysis of the impacts of the taking provided in a programmatic plan. Similarly, the mitigation would be commensurate with project scale, eliminating the necessity for larger-scale mitigation with potentially greater benefit to the Covered Species.

Project-specific permitting does not facilitate a streamlined approach to ESA compliance, in contrast to the programmatic HCP that expedites processing time and reduces the staffing burden on both LCRA TSC and the USFWS. Given the uncertainty associated with processing times for HCPs, LCRA TSC may be at risk for significant project delays that could have significant health and safety implications for their customers.

The nature of LCRA TSC's operations and its critical role in the community require LCRA TSC to consider alternatives that reduce uncertainty and encourage strict financial and schedule planning. Project-specific permitting subjects LCRA TSC to uncertainty regarding the time and financial resources necessary to achieve ESA compliance as LCRA TSC conducts its basic function. LCRA TSC has determined that a programmatic, system-wide HCP best alleviates this uncertainty.

10.2 REDUCED TAKE ALTERNATIVE

LCRA TSC considered an alternative to the proposed HCP that included commitments for the application of best practices for routing, siting, construction methods, and operations that would minimize to a greater degree the amount of take resulting from the LCRA TSC Activities. While alternative route selection might be one way to minimize impacts to the Covered Species, neither the LCRA TSC nor the USFWS have the authority to select alternative routes, as that action is solely within the legal authority and discretion of the PUC. Therefore, under this alternative, LCRA TSC would implement extreme minimization and avoidance measures that would significantly limit construction periods and methods while placing a significant financial burden on LCRA TSC. Such extreme measure might include: restricting all Covered Activities to periods when Covered Species are not present; avoiding to the extent possible all vegetation clearing or other modifications of those portions of the ROW that are Suitable Habitat for a Covered Species; using taller towers and longer spans to traverse Suitable Habitat; minimizing vehicle and equipment access to ROW by requiring crews to travel by foot, restricting such access to dedicated access roads, or using helicopters or bucket trucks (and similar) to perform LCRA TSC Activities; or boring under surface habitats for certain Covered Species.

LCRA TSC rejected this reduced take alternative on the basis that it:

1. would result in unacceptable restrictions on necessary activities and operations (e.g. Emergency Responses may require urgent work during restricted periods or restricting vehicles to established access roads could preclude getting necessary equipment to where it is needed);
2. would dramatically increase the costs of installing and maintaining LCRA TSC facilities (e.g., requiring work crews to manage vegetation using hand tools while on foot would require substantially more labor than using mowers mounted on tractors, or stringing conductors with helicopters is vastly more expensive than performing this activity with traditional equipment on the ground);
3. would risk the safety and reliability of the LCRA TSC network (e.g., extreme minimization of tree clearing and trimming could increase the chance of wildfire sparked by vegetation coming in contact with transmission lines or could reduce the ability of LCRA TSC to access Facilities for Operations and Maintenance or Emergency Responses; and
4. would restrict LCRA TSC's ability to appropriately balance the full suite of human and environmental constraints when planning for new facilities.

In any case, it is unlikely that most New Construction could completely avoid the potential for incidental take of at least one of the Covered Species. Therefore, even with the reduced amount of take, LCRA TSC may still need to engage in the HCP process with the USFWS. In practice, obtaining an ITP takes at least 2 years, even for HCPs addressing very small amounts of take. LCRA TSC might experience mitigation cost savings from the reduced take alternatives, but the costs of implementing the additional minimization measures and inability to consider effects on the Covered Species in context with other important public interests represent an unacceptable alternative for LCRA TSC.

10.3 EXPANDED LIST OF COVERED SPECIES

LCRA TSC considered expanding the list of Covered Species to include additional wildlife species that are currently listed under the ESA and wildlife species that have been petitioned for listing. This alternative would approximately double the current list of Covered Species. Under this alternative, LCRA TSC would need to plan for and propose a conservation program for many wildlife species for which actual incidental take is unlikely to occur in the near future (or ever) and species for which the

USFWS has not developed recommended measures to guide conservation actions. During the HCP preparation process, LCRA TSC determined that, with respect to currently listed species of wildlife that were not included as Covered Species, LCRA TSC Activities were not reasonably likely to result in take. Thus, LCRA TSC elected not to complicate the HCP by expanding its scope to include wildlife species for which take is not reasonably likely to occur in the near term. With respect to species of wildlife that have been petitioned for listing, LCRA TSC determined that its current business interests would not be served by expending significant effort to negotiate a set of conservation measures from scratch for wildlife species that were not currently listed and whose listing is not reasonably certain. In sum, LCRA TSC rejected this alternative in favor of the proposed HCP, which addresses only those needs that are reasonably foreseeable.

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APPENDIX A

National Historic Preservation Act Compliance for Covered Activities

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Appendix A—National Historic Preservation Act Compliance for Covered Activities

Note: Capitalized terms and acronyms used in this appendix that are not defined herein are defined in the Glossary of the LCRA Transmission Services Corporation Transmission System Habitat Conservation Plan.

LCRA TSC's approach to cultural resources and NHPA compliance for Covered Activities involves:

- After the PUC routing process has established a route for a new Facility and/or LCRA TSC has determined that New Construction associated with that new Facility will be a Covered Activity, LCRA TSC will make a recommendation regarding the appropriate area of potential effect (APE) to the state historic preservation officer (SHPO). For purposes of compliance with Sections 101 and 106 of the NHPA for federal undertakings, the APE will include any areas of Direct Habitat Modification or Indirect Habitat Modification for Relevant Covered Species caused by the Covered Activity plus areas where minimization and compensatory mitigation measures will be implemented pursuant to the ITP, as set forth in Appendix A to the U.S. Fish and Wildlife Service's (USFWS's) *Habitat Conservation Planning and Incidental Take Permit Processing Handbook* (HCP Handbook).[1] In the event SHPO determines that the APE for a Covered Activity is broader than the APE described herein, the USFWS recognizes that the take and compensatory mitigation assessments set forth in the HCP remain in place and will be neither expanded nor altered.
- LCRA TSC will make a recommendation to the SHPO as to whether any resources subject to the NHPA Sections 101 and 106 (Historic Properties) may be present in the APE of the Covered Activity. This recommendation will be made in accordance with the relevant provisions of NHPA Sections 101 and 106, Advisory Council on Historic Preservation (ACHP) regulations and guidance, and relevant USFWS guidance, including Appendix A to the HCP Handbook.
- The specific steps for identifying Historic Properties associated with a Covered Activity are as follows:
    - In order to determine whether Historic Properties may be present within the APE of a Covered Activity, qualified LCRA TSC staff or consultants will review the Covered Activity description, along with maps and relevant sources of available information, including specifically the Texas Historical Commission's (THC's) Site Atlas database. In addition, LCRA TSC will review sources of information identified and made available by the USFWS, any relevant Tribal Historic Preservation Officers or tribe, and any other relevant parties.[2]
    - LCRA TSC will work together with the SHPO and, if it is determined that a high probability of Historic Properties exist within the APE, LCRA TSC will commission a field study. Field studies may include a pedestrian survey and sample subsurface probing of proposed construction or development areas that may yield evidence of cultural resources (e.g., historic sites, historic buildings and structures, and prehistoric sites). LCRA TSC will notify the USFWS and any other relevant parties (such as tribes) whether Historic Properties were identified within the APE and whether such resources may be affected by the Covered Activity.

[1] U.S. Fish and Wildlife Service and National Marine Fisheries Service. 2016. *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*. Available at: https://www.fws.gov/endangered/esa-library/pdf/HCP_Handbook.pdf. Accessed June 2017.

[2] LCRA conducts all phases of cultural resources assessments, consisting of file searches, construction monitoring, archeological surface reconnaissance, and intensive cultural resource survey, including field investigations, analyses, and reporting, in a systematic manner for all types of archeological sites on LCRA-owned lands and within LCRA ROW right-of-way easements that may be impacted by proposed development projects that are funded by LCRA.

Appendix A—National Historic Preservation Act Compliance for Covered Activities

Note: Capitalized terms and acronyms used in this appendix that are not defined herein are defined in the Glossary of the LCRA Transmission Services Corporation Transmission System Habitat Conservation Plan.

- When Historic Properties are identified within the APE, LCRA TSC will evaluate and make a recommendation as to whether those resources may suffer adverse effects as a result of the Covered Activity. The effects analysis will include, among other things, an analysis of indirect effects—including effects on the natural or built environments, visual effects, and potential effects to landscapes.
- Where it is determined that Historic Properties may be adversely affected, LCRA TSC will document the potential means it will take to avoid, minimize, and mitigate those effects, and will provide written documentation of the same to the USFWS, SHPO, THC, and other relevant parties. In developing measures to avoid, minimize, and/or mitigate such effects, LCRA TSC will follow relevant ACHP regulations and guidance, as well as any relevant guidance of the USFWS, including that found within Appendix A of the HCP Handbook.

Generally, Upgrades and Decommissioning, Operations and Maintenance, and Emergency Responses involving LCRA TSC Facilities will not trigger the process described above. However, there may be circumstances where such activities could have effects on Historic Properties. In those circumstances, LCRA TSC will comply with applicable law.

APPENDIX B

Species of Concern Review

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TECHNICAL MEMORANDUM

To: Erik Huebner, Environmental Affairs, Lower Colorado River Authority (LCRA), on behalf of LCRA Transmission Services Corporation (LCRA TSC)

CC: Lyn Clancy, LCRA Managing Associate General Counsel, on behalf of LCRA TSC
Alan Glen, Nossaman LLP

From: Amanda Aurora, SWCA Environmental Consultants

Date: July 5, 2019

Re: LCRA TSC Transmission System Habitat Conservation Plan – Rationale for List of Covered Species

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LCRA Transmission Services Corporation (LCRA TSC) is preparing a Habitat Conservation Plan (HCP) that will support an application to the U.S. Fish and Wildlife Service (USFWS) for an Incidental Take Permit (ITP) under the Endangered Species Act (ESA). Capitalized terms and phrases used in this Technical Memorandum have the definitions stated in the Glossary to the HCP.

The HCP and ITP would cover the impacts of incidental take associated with certain construction, operation, upgrade, decommissioning, and maintenance activities associated with current and future LCRA TSC electrical transmission lines, substations, access roads, and related infrastructure and facilities that LCRA TSC elects to enroll in the HCP (collectively, the Covered Activities). The HCP Plan Area is the 221-county Electric Reliability Council of Texas (ERCOT) region in Texas, plus any Texas county bordering the ERCOT region, for a total of 241 of the 254 counties in the state of Texas. The proposed ITP Term is 30 years from the date of issuance. LCRA TSC proposes that the HCP address 23 Covered Species that may be incidentally taken by Covered Activities, of which only 1 is not currently listed as threatened or endangered under the ESA.

To derive the list of Covered Species, LCRA TSC considered the potential effects of its LCRA TSC Activities on a set of Species of Concern. As defined herein, Species of Concern are those species that, as of the date of this Technical Memorandum, are:

- listed as threatened or endangered, or that have been, or are likely to be, proposed for such listing;
- identified by the USFWS as candidates for future listing;
- included on an active petition for listing;
- included on the USFWS's 7-year Work Plan for addressing ESA listing and critical habitat decisions, dated September 2016; or
- listed as threatened or endangered by the State of Texas.

This Technical Memorandum summarizes basic ecological information about each Species of Concern, provides a preliminary assessment of the likelihood for LCRA TSC Activities to adversely affect each Species of Concern, and presents a brief rationale for whether or not a Species of Concern is addressed in the HCP as a Covered Species.

METHODS AND APPROACH

SWCA created a list of Species of Concern for the Plan Area from the following sources:

- Current list of federally threatened and endangered species (USFWS 2018)
- Current list of species proposed for federal listing (USFWS 2018)
- Current list of species with active petitions for listing consideration (USFWS 2018)
- Current list of federal candidate species (i.e., those with "warranted, but precluded" findings) (USFWS 2018)
- Species included on the USFWS's 7-year Work Plan for action on high priority listing and critical habitat decisions (USFWS 2016)
- Species currently listed as threatened or endangered by the State of Texas (31 Texas Administrative Code §65.175 and §65.176)

These sources returned a list of 245 Species of Concern with the potential to occur in the Plan Area. To this list, SWCA added two other species, *Cicurina loftini and Batrisodes cryptotexanus*, for consideration. The karst invertebrate, *Cicurina loftini*, may be taxonomically synonymized with another listed species and become, itself, a listed taxon. *Batrisodes cryptotexanus*, another karst invertebrate, may be split out as a new species from the currently endangered *Batrisodes texanus*. These additions give the list of Species of Concern a total of 247 species.

SWCA also investigated the feasibility of including species that appear on TPWD's county lists of rare, threatened, and endangered species (accessed via online map viewer requests to https://tpwd.texas.gov/gis/rtest/), as well as "*Texas Conservation Action Plan: Species of Greatest Conservation Need*" (TPWD 2011) or that were ranked by NatureServe as being "critically imperiled" or "imperiled" (NatureServe 2015). However, these additional sources would have returned several hundred more potential Species of Concern for evaluation. SWCA concluded that including species from these additional sources to the list of Species of Concern was impractical; therefore, SWCA limited Species of Concern to those species appearing on the sources identified in the list above.

For each of the 247 Species of Concern, SWCA summarized basic biological, habitat, distribution, abundance, and status information (see Table 1). SWCA obtained most information for this summary from the NatureServe Explorer database (NatureServe 2015) as a readily available source of basic information for the long list of Species of Concern. SWCA recognizes that NatureServe Explorer, while readily accessible for a wide array of species, is not always the most accurate or up-to-date source of information. Therefore, SWCA supplemented the basic information from NatureServe Explorer with information from other sources when senior biologists recognized that better data were readily available. The summarized data in Table 1 are meant to provide a basis for quickly screening the list of Species of Concern for those with a risk of take from the LCRA TSC Activities and are not intended to be a complete treatment of the current status of each Species of Concern.

SWCA also reviewed each Species of Concern to quickly assess: 1) the current status or future likelihood of listing under the ESA; 2) the likelihood for exposure to LCRA TSC Activities; and 3) the likelihood for adverse effects arising from LCRA TSC Activities (see Table 2). To help guide the assessment, SWCA identified the following seven general categories of potential ways LCRA TSC Activities might affect a Species of Concern (Potential Effect Pathways):

- Vegetation clearing
- Vegetation maintenance
- Soil disturbance or surface grading
- Subsurface excavation
- Nuisance (i.e., noise, light, and human activity)
- Collision or Avoidance of Structures
- Fill in Aquatic Habitats

SWCA scored each Species of Concern using a scale of 0 to 3 for each Potential Effect Pathway and for an overall assessment of potential adverse effect for the species from LCRA TSC Activities. SWCA defined the scoring scale as follows:

0 = Adverse effects are not possible

1 = Adverse effects are possible, but not expected

2 = Adverse effects may occur or the likelihood for occurrence is uncertain

3 = Adverse effects are expected

In scoring each Species of Concern, SWCA considered the biology, habitat, distribution, and abundance of the species; the nature of the LCRA TSC Activities; the potential for conservation measures or best practices to avoid or minimize the likelihood of an adverse effect below the threshold where incidental take is reasonably certain to occur; and the potential distribution of LCRA TSC Activities (see Figure 1 and Chapter 4.3.2).

In addition to the approach described above, SWCA compiled and LCRA TSC considered more detailed information on the biology, habitat, and current status of 48 of the Species of Concern that were initially considered for possible inclusion as Covered Species early in the HCP process. LCRA TSC also discussed with the USFWS the need for incidental take authorization for certain Species of Concern during several work sessions held between March 2017 and July 2018.

General Rationale for List of Covered Species

The following discussion summarizes the rationale for including or not including Species of Concern on the list of Covered Species in the HCP. Tables 1 and 2 provide additional detail and notes for each of the 247 Species of Concern to clarify the rationale for these decisions. However, the ultimate list of species covered in the HCP may change based on the outcome of more detailed reviews of the best

available science, additions to or subtractions from the list of ESA-protected species, or further assessments by LCRA TSC of the likelihood of take from the LCRA TSC Activities.

Proposed for Coverage

LCRA TSC proposes to include 23 species that are currently listed as federally threatened or endangered or have some likelihood for listing in the foreseeable future as Covered Species in the HCP. These species could be exposed to LCRA TSC Activities in a manner in which incidental take might not be readily avoided.

- Birds
  - Golden-cheeked warbler (*Setophaga chrysoparia*) – endangered
  - Whooping crane (*Grus americana*) – endangered
  - Piping plover (*Charadrius melodus*) – threatened
  - Rufa red knot (*Calidris canutus rufa*) – threatened
  - Red-cockaded woodpecker (*Picoides borealis*) – endangered
- Mammals
  - Ocelot (*Leopardus pardalis*) – endangered
- Reptiles
  - Spot-tailed earless lizard (*Holbrookia lacerata*) – petitioned for listing
- Spring-associated Aquatic Salamanders
  - Barton Springs salamander (*Eurycea sosorum*) – endangered
  - Georgetown salamander (*Eurycea naufragia*) – threatened
  - Jollyville Plateau salamander (*Eurycea tonkawae*) – threatened
  - Salado Springs salamander (*Eurycea chisholmensis*) – threatened
  - San Marcos salamander (*Eurycea nana*) – threatened
- Other Amphibians
  - Houston toad (*Bufo houstonensis*) – endangered
- Spring-associated Aquatic Invertebrates
  - Comal Springs riffle beetle (*Heterelmis comalensis*) – endangered
  - Peck's Cave amphipod (*Stygobromus pecki*) – endangered
- Terrestrial Karst Invertebrates
  - Travis and Williamson Counties
    - Bee Creek Cave harvestman (*Texella reddelli*) – endangered
    - Tooth Cave spider (*Tayshaneta myopica*) – endangered
    - Tooth Cave ground beetle (*Rhadine persephone*) – endangered
  - Bexar County
    - Madla Cave meshweaver (*Cicurina madla*) – endangered
    - Government Canyon Bat Cave spider (*Tayshaneta microps*) – endangered
    - Helotes mold beetle (*Batrisodes venyivi*) – endangered
    - *Rhadine exilis* – endangered
    - *Rhadine infernalis* – endangered

Not Proposed for Coverage

Species not proposed for coverage are not likely to be taken by the LCRA TSC Activities because: 1) they occur in habitats or locations where LCRA TSC Activities are unlikely to occur; 2) take may be

avoided with the application of practicable, voluntary conservation measures; 3) federal listing as threatened or endangered is not anticipated in the immediate future; and/or 4) take may be addressed through participation in other HCPs. General rationale for not covering for certain categories of Species of Concern is provided below.

- Deep Aquifer Species – Several fully aquatic species (such as blind salamanders and blindcats, among others) utilize the deep passages of the Edwards Aquifer and are largely disconnected from activities that occur on the surface. The LCRA TSC Activities do not involve a substantial amount of deep subsurface excavation, extensive additions of impervious cover to the surface, or require withdrawal of groundwater. Therefore, the deep aquifer species are unlikely to be exposed to the effects of the LCRA TSC Activities to an extent that is reasonably certain to cause take. LCRA TSC may consider implementing voluntary conservation measures to *minimize water quality impacts during construction* to further reduce the risk of adverse effects.

- Marine Species –LCRA TSC is not expected to conduct LCRA TSC Activities in marine habitats. Therefore, marine species (including sea turtles and the West Indian manatee, among others) are not likely to be exposed to the LCRA TSC Activities.

- Freshwater Surface Species – LCRA TSC can, in most cases, plan LCRA TSC Activities to avoid direct modification of freshwater surface habitats, such as rivers, streams, lakes, ponds, and wetlands. Fully aquatic species (such as fish, mollusks, and aquatic insects) and marshland species are unlikely to be directly affected by the LCRA TSC Activities. However, in some cases, voluntary conservation measures may be warranted to *avoid or minimize impacts to wetland or adjacent riparian habitat* that contributes to the character or quality of the freshwater surface aquatic habitat.

- Snails – Several species of springsnail, cavesnail, and mountainsnail are included in the list of Species of Concern. In each case, the known range and distribution of these species are very small and/or the species is associated with surface or aquifer aquatic habitats. The fringed mountainsnail is only known from Texas in the fossil record. These species are unlikely to be exposed to the LCRA TSC Activities. However, voluntary conservation measures may be warranted to *avoid or minimize impacts to occupied spring runs and adjacent riparian habitat*.

- Certain Terrestrial Karst Invertebrates – Terrestrial karst invertebrates that have ranges fully covered by the enrollment area of other HCPs (i.e., the Williamson County Regional HCP, the Balcones Canyonlands Conservation Plan, or the Southern Edwards Plateau HCP) are not included as Covered Species since LCRA TSC anticipates participating in these other HCPs to achieve ESA compliance.

- Remote and/or Extremely Range-restricted Species – Some species (such as Mexican spotted owl, Palo Duro mouse, western yellow-billed cuckoo, Louisana pinesnake, Attwater's greater prairie-chicken, among others) have ranges or distributions that are very small, located in remote or extremely rugged parts of Texas, and/or limited to protected lands like national wildlife refuges or state parks. In such cases, the species are unlikely to be exposed to the LCRA TSC Activities.

- Extinct or Extirpated from Texas – Species that are thought to be extinct or extirpated from Texas (such as the Eskimo curlew, red wolf, gray wolf, Louisiana black bear, and jaguar, among others) are not likely to be exposed to the LCRA TSC Activities.

- Federal Listing Not Anticipated – Most Species of Concern are not federally listed and are not likely to become considered for federal listing in the immediate future (i.e., the next 5 to 10 years). Given the uncertainty regarding future listing status and the often scant body of available science with which to evaluate impacts, estimate take, and propose conservation measures, LCRA TSC has decided to not include most unlisted Species of Concern on the list of Covered Species for the HCP. Instead, the HCP includes a Changed Circumstance that addresses new listings (see Chapter 9.1.2).

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Table 1. LCRA TSC Transmission System Habitat Conservation Plan: Species of Concern Background Table

July 5, 2019

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
1.	*Eurycea waterlooensis*	Austin blind salamander	Amphibians	Deep Aquifer Aquatic	No	E	Designated-Travis and Williamson Counties, Texas	-	G1	S1	Nature Serve (2015)[1]: Found in subterranean cavities of the Edwards Aquifer, as well as spring outlets.	Nature Serve (2015): Unknown subterranean range, but observed at three of the four spring outlets of Barton Springs in Travis County, Texas.	Nature Serve (2015): Unknown, though observed 17 times during surveys from 1998–2000.
2.	*Eurycea sosorum*	Barton Springs salamander	Amphibians	Shallow Aquifer / Spring Aquatic	No	E	No	E	G1	S1	TPWD (2017): Found in subterranean water-filled caverns of Barton Springs and in aquatic plants and algae along the edge of the flowing spring.	Chippindale et al. (2014)[2]: A small number of springs in Travis and Hays Counties.	Hammerson & Chippindale (2004)[3]: Population size unknown, but stable trend.
3.	*Notophthalmus meridionalis*	Black-spotted newt	Amphibians	Freshwater Surface Aquatic	No	Petitioned for Listing: Findings Not Yet Made	No	T	G1	S2	Nature Serve (2015): Found in permanent and temporary ponds, roadside ditches, and stream pools.	Nature Serve (2015): Gulf Coastal Plain, from south of the San Antonio River in Texas south to Mexico.	Flores-Villela et al. (2008)[4]: Not abundant at any locality, maximum of 25 individuals at one site.
4.	*Eurycea robusta*	Blanco blind salamander	Amphibians	Deep Aquifer Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	T	G1Q	S1	Nature Serve (2015): Occurs in benthic, water-filled, subterranean caverns.	Nature Serve (2015): San Marcos pool of the Balcones Aquifer in south-central Texas.	Hammerson & Chippindale (2004)[5]: Unknown but inaccessible to survey.
5.	*Eurycea latitans*	Cascade Caverns salamander	Amphibians	Shallow Aquifer / Spring Aquatic	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	T	G3	S1	Hammerson & Chippindale (2004)[6]: Found in caves and springs with water in limestone.	Nature Serve (2015): Comal, Kerr, Kendall, and Hays Counties in various springs.	Hammerson & Chippindale (2004): Unknown but appears to vary among localities.
6.	*Eurycea tridentifera*	Comal blind salamander	Amphibians	Deep Aquifer Aquatic	No	Petitioned for Listing: Findings Not Yet Made	No	T	G1	S1	Nature Serve (2015): Occurs in benthic, water-filled, subterranean caverns.	Nature Serve (2015): Southeastern margin of Edwards Plateau of central Texas.	Hammerson & Chippindale (2004)[7]: Unknown, but scarce during visits to the type locality.
7.	*Eurycea sp. 8*	Comal Springs salamander	Amphibians	Shallow Aquifer / Spring Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	-	G1Q	S1	Nature Serve (2015): Occurs in benthic habitat, in springs.	Nature Serve (2015): Only in Texas in Comal Springs in Landa Park and Landa Lake, Comal County.	Nature Serve (2015): Population size unknown, only one occurrence.
8.	*Eurycea naufragia*	Georgetown salamander	Amphibians	Shallow Aquifer / Spring Aquatic	No	T with Special 4(d) Rule	Proposed	-	G1	S1	Nature Serve (2015): Found in springs and caves.	Nature Serve (2015): Drainages of the south, middle, and north forks of the San Gabriel River in Williamson County, Texas. Also possible populations in the Cowan Creek drainage and from Bat Well in the Berry Creek drainage. Cowan Creek drains into the San Gabriel River.	Pierce et al. (2010)[8]: Known from 14 locations in Williamson County, Texas.
9.	*Anaxyrus (syn. Bufo) houstonensis*	Houston toad	Amphibians	Aquatic / Terrestrial	No	E	Designated-Bastrop and Burleson Counties, Texas	E	G1	S1	Nature Serve (2015): Adults found in soft sandy soils in pine forests, mixed deciduous forests and coastal prairie. Eggs/larvae develop in shallow water that persists for minimum of 60 days	Nature Serve (2015): Only in Texas; largest populations found in Bastrop County, Texas; also found in the following Texas Counties: Austin, Burleson, Colorado, Lavaca, Lee, Leon, Milam, Robertson.	Nature Serve (2015): Approximately 1,000 to 2,500 individuals.
10.	*Eurycea tonkawae*	Jollyville Plateau salamander	Amphibians	Shallow Aquifer / Spring Aquatic	No	T	Designated-Travis and Williamson Counties, Texas	T	G1	S2S3	Nature Serve (2015): Occurs in springs and waters of caves.	Nature Serve (2015): Springs northwest of Austin in Travis and Williamson Counties, Texas.	USFWS (2007)[9]: One cave in the Cypress creek drainage and 12 caves in the Buttercup creek cave system in the Brushy creek drainage.
11.	*Rhinophrynus dorsalis*	Mexican burrowing toad	Amphibians	Aquatic / Terrestrial[10]	No	-	No	T	G5	S2	Nature Serve (2015): Found in the lowlands of tropical moist and dry forests. TPWD (2017): Found wherever loose friable soils are present, such as temporary ponds, arroyos, or roadside ditches.	Nature Serve (2015): Pacific drainage of Costa Rica and Mexico, Atlantic Drainage of Honduras, and coastal lowlands of southern Texas.	Nature Serve (2015): Approximately 10,000 - 1,000,000 individuals.

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[10] AmphibiaWeb. Mexican burrowing toad. 2017. Available at http://amphibiaweb.org/species/4319. University of California, Berkeley, CA, USA. Accessed 17 Jan 2017.

Red text denotes inclusion as a Covered Species.

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
12.	*Smilisca baudinii*	Mexican treefrog	Amphibians	Aquatic / Terrestrial	No	-	No	T	G5	S3	Nature Serve (2015): Found in gardens with pools, foothills, lowlands, xerophytic vegetation, savannas in semiarid regions, and humid evergreen forest in Caribbean lowlands.	Nature Serve (2015): Central Costa Rica up through southern Sonora, the Yucatan Peninsula, and the Rio Grande embayment in extreme southern Texas.	Nature Serve (2015): Abundant and widespread through Middle America.
13.	*Eurycea chisholmensis*	Salado Springs salamander	Amphibians	Shallow Aquifer / Spring Aquatic	No	T	Proposed	-	G1	S1	Nature Serve (2015): Found in gravel substrates, under rocks, and in the vicinity of spring outflows.	Nature Serve (2015): Range includes Big Boiling (= Main, Salado, or Siren) Springs and Robertson springs at Salado in Bell County, Texas. May also be found in Buttermilk Creek springs.	Nature Serve (2015): Unknown population estimate.
14.	*Eurycea nana*	San Marcos salamander	Amphibians	Shallow Aquifer / Spring Aquatic	No	T	Designated- Hays County, Texas	T	G1	S1	Nature Serve (2015): Found in alkaline, shallow springs with gravel and sand substrates carved from limestone. TPWD (2017): Water characterized by algal mats and aquatic moss at temperatures of 21°C–22°C.	Nature Serve (2015): Only in the San Marcos Springs and Spring Lake in Texas, plus a short distance downstream.	Hammerson & Chippindale (2004)[11]: Estimated at 53,000 in 1996, abundant in its small range.
15.	*Hypopachus variolosus*	Sheep frog	Amphibians	Aquatic / Terrestrial[12]	No	-	No	T	G5	S2	Tipton et al. (2012): Found near water in thorn scrub, open woodland, savanna, and pasture.	Nature Serve (2015): Through the Atlantic and Pacific slopes of Mexico to Costa Rica and northward through southern Texas.	Nature Serve (2015): Common and widespread throughout the Yucatan Peninsula, fairly common in Texas.
16.	*Siren sp 1*	South Texas siren (large form)	Amphibians	Freshwater Aquatic	No	-	No	T	GNRQ	S2	Nature Serve (2015): Inhabit any body of water with or without submergent vegetation, prefer quiet and permanent water features with a soft, mucky bottom.	Nature Serve (2015): In a narrow portion of Gulf Coastal Plain south of Corpus Christi, otherwise limited to lower Rio Grande drainage of Texas and Mexico.	Nature Serve (2015): Difficult to sample but may be abundant.
17.	*Typhlomolge (syn. Eurycea) rathbuni*	Texas blind salamander	Amphibians	Deep Aquifer Aquatic	No	E	No	E	G1	S1	Nature Serve (2015): Found in water-filled subterranean caverns. In some sites, known only from individuals washed out of artesian wells	Nature Serve (2015): San Marcos Pool of the Edwards Aquifer, Hays County, south-central Texas.	Hammerson & Chippindale (2004)[14]: Population size unknown but appear common and stable in outflows.
18.	*Eurycea neotenes*	Texas salamander	Amphibians	Shallow Aquifer / Spring Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	-	G1	S2	Nature Serve (2015): Occurs in spring systems.	Nature Serve (2015): In Texas in Helotes Creek Spring and, Leon Springs in Bexar County, and Mueller's Spring in Bexar County.	Hammerson & Chippindale (2004)[15]: Uncertain, but may be common at spring outflows, varies among localities.
19.	*Leptodactylus fragilis*[16]	White-lipped frog	Amphibians	Aquatic / Terrestrial	No	-	No	T	G5	S1	Tipton et al. (2012)[17]: Found in various mesic habitats such as fields, ditches, oxbow lakes, resacas, and grasslands.	Nature Serve (2015): Northern Venezuela and Colombia up through Central America, Mexico, and extreme southern Texas.	Nature Serve (2015): Approximately 100,000 to >1,000,000 individuals.
20.	*Texella reddelli*	Bee Creek Cave harvestman	Arachnids	Terrestrial Karst	No	E	No	-	G2G3	S2	Ubick and Briggs (2004)[18]: Found in caves and in talus at base of roadcuts.	Ubick and Briggs (2004): Travis and Burnet Counties.	Nature Serve (2015): Unknown population estimate.
21.	*Texella reyesi*	Bone Cave harvestman	Arachnids	Terrestrial Karst	No	E; petitioned for delisting	No	-	G2G3	S2	Nature Serve (2015): Often found under large rocks in small isolated caves of the Edwards Limestone Formation. Sensitive to humidity below saturation, found in coolest parts of caves.	Nature Serve (2015): Caves throughout Travis and Williamson Counties, Texas.	USFWS (2009)[19]: Known from 168 caves.

[11] Hammerson, G. and P. Chippindale. 2004. *Eurycea nana*. The IUCN Red List of Threatened Species 2004: e.T8391A12909269. Available at http://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T8391A12909269.en. Accessed February 1, 2017.
[12] AmphibiaWeb. Sheep frog. 2017. Available at http://amphibiaweb.org/cgi/amphib_query?where-genus=Hypopachus&where-species=variolosus. University of California, Berkeley, CA, USA. Accessed 17 Jan 2017.
[13] RECON Environmental Inc., Hicks & Company, Zara Environmental LLC, and BIO-WEST. 2012. Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan. Prepared for the Edwards Aquifer Recovery Implementation Program.
[14] Hammerson, G., and P. Chippindale. 2004. *Eurycea rathbuni*. The IUCN Red List of Threatened Species 2004: e.T39262A10173274. Available at http://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T39262A10173274.en. Accessed February 2, 2017.
[15] Hammerson, G. and P. Chippindale. 2004. *Eurycea neotenes*. The IUCN Red List of Threatened Species 2004: e.T59272A11908327. Available at http://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T59272A11908327.en. Accessed February 2, 2017.
[16] Frost, Darrel R. 2016. Amphibian Species of the World: an Online Reference. Version 6.0 (Accessed 1/17/2017). Electronic Database accessible at http://research.amnh.org/herpetology/amphibia/index.html. American Museum of Natural History, New York, USA.
[17] Tipton, B.L., T.L. Hibbits, T.D. Hibbits, T.J. Hibbits, and T.J. LaDuc. 2012. Texas amphibians: A field guide. Texas A&M University Press. Print.
[18] Ubick, D., and T.S. Briggs. 2004. The harvestman family Phalangodidae. 5. New records and species of Texella Goodnight and Goodnight (Opiliones: Laniatores). Texas Memorial Museum, Speleological Monographs 6:101–141.
[19] USFWS. 2009. 5-Year Review: Bone Cave Harvestman (*Texella reyesi*). USFWS Austin Ecological USFWS Field Office, Austin, TX. 22 pp.

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Table 1. LCRA TSC Transmission System Habitat Conservation Plan: Species of Concern Background Table

July 5, 2019

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
22.	*Cicurina venii*	Braken Bat Cave meshweaver	Arachnids	Terrestrial Karst	No	E	Designated-Bexar County, Texas	-	G1	S1	Nature Serve (2015): Species is a subterranean obligate.	Nature Serve (2015): Only one specimen found in Braken Bat Cave in Bexar County, Texas. Hedin et al. (2018)[20]: May be synonymous with *Cicurina madla*.	Nature Serve (2015): Unknown population estimate.
23.	*Texella cokendolpheri*	Cokendolpher Cave harvestman	Arachnids	Terrestrial Karst	No	E	Designated-Bexar County, Texas	-	G1	S1	Nature Serve (2015): Species is a subterranean obligate.	Nature Serve (2015): Known only from the Robber Baron Cave of Bexar County, Texas.	Nature Serve (2015): Unknown population estimate.
24.	*Cicurina vespera*	Government Canyon Bat Cave meshweaver	Arachnids	Terrestrial Karst	No	E	Designated-Bexar County, Texas	-	G1	S1	Nature Serve (2015): Species is a subterranean obligate.	Nature Serve (2015): Only known from Government Canyon Vat Cave, located in Bexar County, Texas. Hedin et al. (2018): May be synonymous with *Cicurina loftini*.	Nature Serve (2015): Unknown population estimate.
25.	*Tayshaneta microps*	Government Canyon Bat Cave spider	Arachnids	Terrestrial Karst	No	E	Designated-Bexar County, Texas	-	G1	S1	Nature Serve (2015): Species is a subterranean obligate.	Nature Serve (2015): Known from Government Canyon Bat Cave and Surprise Sink Cave in Bexar County, Texas.	Nature Serve (2015): Unknown population estimate.
26.	*Cicurina madla*	Madla Cave meshweaver	Arachnids	Terrestrial Karst	No	E	Designated-Bexar County, Texas	-	G1	S1	Nature Serve (2015): Spins webs underneath rocks and in crevices. Found among mud balls and loose rocks.	USFWS (2011)[21]: Collected from at least 22 caves in the four Bexar County Karst Fauna Regions (KFRs) associated with the Edwards Limestone formation (e.g., Government Canyon KFR, Stone Oak KFR, Helotes KFR, and the UTSA KFR)	Nature Serve (2015): Unknown population estimate.
27.	*Cicurina baronia*	Robber Baron Cave meshweaver	Arachnids	Terrestrial Karst	No	E	Designated-Bexar County, Texas	-	G1	S1	Nature Serve (2015): Species is a subterranean obligate.	USFWS (2011): Two caves, both located in the Alamo Heights KFR Paquin and Ledford (2012): May be synonymous with *Cicurina loftini* and *Cicurina vespera* Taxonomic revisions could expand the range of this species into the Culebra Anticline KFR.	Nature Serve (2015): Unknown population estimate.
28.	*Cicurina loftini*	no common name	Arachnids	Terrestrial Karst	No	-	No	-	-	-	Nature Serve (2015): Species is a subterranean obligate.	Paquin and Dupérré (2009)[22]: Caracol Creek Coon Cave and SBC Cave García de León and Krejca (2009)[23]: Clandestine Cupola Cave Hedin et al. (2018): May not be a valid taxon, but synonymous with *Cicurina vespera*.	Paquin and Dupérré (2009) and García de León and Krejca (2009): Three caves from the Culebra Anticline KFR in Bexar County, Texas.
29.	*Tartarocreagris texana*	Tooth Cave pseudoscorpion	Arachnids	Terrestrial Karst	No	E	No	-	G1G2	S1	Nature Serve (2015): Often found under rocks in small, dry, isolated caves within the Edwards Limestone formation.	Nature Serve (2015): Tooth and Amber Caves in Travis County, Texas.	Nature Serve (2015): Only known from those two caves.
30.	*Tayshaneta myopica*	Tooth Cave spider	Arachnids	Terrestrial Karst	No	E	No	-	G1G2	S1	Nature Serve (2015): Found in small, dry isolated cave in the Edwards Limestone Formation.	Nature Serve (2015): Tooth Cave in Edwards Plateau of Travis County, Texas.	Nature Serve (2015): Approximately 1 to 1,000 individuals.

[20] Hedin, M., S. Derkarabetian, J. Blair, and P. Paquin. 2018. Sequence capture phylogenomics of eyeless Cicurina spiders from Texas caves, with emphasis on US federally-endangered species from Bexar County (Araneae, Hahniidae). *ZooKeys* 769:49-76.
[21] United States Fish and Wildlife Service (USFWS). 2011. Bexar County Karst Invertebrates Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, NM.
[22] Paquin, P. and N. Dupérré. 2009. A first step towards the revision of Cicurina: redescription of type specimens of 60 troglobitic species of the subgenus Cicurella (Araneae: Dictynidae), and a first visual assessment of their distribution. Zootaxa, 2002: 1-67
[23] García de León, F.J. and J. Krejca. 2009. Zara Environmental Karst Invertebrate Technical Report for SH 151 from Wiseman Road to Loop 1604, Bexar County, Texas.

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Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
31.	*Falco peregrinus anatum*	American peregrine falcon	Birds	Terrestrial	Yes	Delisted	No	T	G4T4	S2B	USFWS (2017)[24]: Breeding falcons often use cliffs and almost always near water and or open habitat for foraging.	Nature Serve (2015): Breeds across Alaska and Canada south to Baja California and Mexico. TPWD (2017): Trans-Pecos region of Texas including the Davis, Chisos and Guadalupe Mountains.	USFWS (2003)[25]: 3,005 nesting pairs in 2003
32.	*Tympanuchus cupido attwateri*	Attwater's greater prairie-chicken	Birds	Terrestrial	No	E	No	E	G4T1	S1B	Nature Serve (2015): Found in Gulf Coast prairies, fallow rice fields, pastures, croplands.	Nature Serve (2015): Gulf coast prairies of Texas; probably extirpated from Louisiana. USFWS (2010)[26]: Currently three known populations in Texas at Attwater Prairie Chicken National Wildlife Refuge (Colorado County), Texas City Prairie Preserve (Galveston County), and a private ranch in Goliad County	USFWS (2010): 90 individuals in the wild as of March 2009
33.	*Peucaea (syn. Aimophila) aestivalis*	Bachman's sparrow	Birds	Terrestrial	Partially	-	No	T	G3	S3B	Nature Serve (2015): Found in mature to old growth pine woodland; requires limited shrub and hardwood midstory with well-developed herb and grass layer, breed where fires create suitable conditions.	Nature Serve (2015): Southeastern U.S.; from eastern Texas and Oklahoma to Tennessee and North Carolina south to Gulf Coast.	Nature Serve (2015): Approximately 2,500 to 10,000 individuals.
34.	*Haliaeetus leucocephalus*	Bald eagle	Birds	Terrestrial	Yes	Delisted	No	T	G5	S3B, S4N	TPWD (2017): Breeding territory is primarily on the edge of rivers, lakes, or reservoirs with large, tall (40–120-foot) trees. Open water or wetlands a mile within the nests is needed for feeding. Over- wintering bald eagles also found near open water and areas with high concentrations of prey. In Texas, wintering eagles also found on rangelands.	TPWD (2017): U.S., Canada, and northern Mexico. In Texas there are both breeding and nonbreeding or wintering bald eagles. Breeding eagles occur mostly in the eastern half of the state and along the coast from Rockport to Houston. Wintering bald eagles are found in the Panhandle, Central, and East Texas.	USFWS (2006)[27]: 9,789 breeding pairs in the lower 48 states of the U.S. in 2007; 156 breeding pairs in Texas in 2007.
35.	*Laterallus jamaicensis*	Black rail	Birds	Wetlands	Yes	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G3G4	S2B	Nature Serve (2015): Occurs in herbaceous wetlands (salt, brackish and freshwater marshes).	All About Birds (2017)[28]: Atlantic and Gulf coasts of U.S., scattered locations elsewhere in U.S., as well as in the Caribbean, Mexico, and Central and South America.	Nature Serve (2015): Approximately 100,000 to 1,000,000 individuals.
36.	*Vireo atricapilla*	Black-capped vireo	Birds	Terrestrial	Yes	Delisted	No	E	G3	S2B	TPWD (2017): Found in oak-juniper woodlands with patchy, two-layered shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover.	Nature Serve (2015): Oklahoma, Texas, Mexico.	Nature Serve (2015): Estimated 6,200 individuals.
37.	*Glaucidium brasilianum cactorum*	Cactus ferruginous pygmy-owl	Birds	Terrestrial	No[29]	Delisted	No	T	G5T3	S3B	Nature Serve (2015): Largest population in Texas found in live oak (*Quercus fusiformis*) and mesquite (*Prosopis glandulosa*) forested coastal sand plains. Formerly in coastal plain oak associations and Tamaulipan thornscrub in the lower Rio Grande valley.	Nature Serve (2015): Sub-species range from northwestern Mexico to Michoacan, up through northwestern Mexico and southern Texas and south-central Arizona.	Nature Serve (2015): Range-wide population unknown, but 1,308 individuals estimated for Kenedy Brooks, Kenedy, and Willacy County, Texas, and 745 to 1,823 individuals were estimated in 29,000 hectares of live oak-mesquite habitat in Kenedy County.
38.	*Buteogallus anthracinus*	Common black-hawk	Birds	Terrestrial	Yes[30]	-	No	T	G4G5	S2B	Nature Serve (2015): Found foraging on tidal flats or open woodlands, generally near water in both moist and arid habitat of lowland forest, mangroves, and swamps. Lockwood and Freeman (2014): Found in riparian corridors in mountainous or semi-arid regions	Nature Serve (2015): Resident from Venezuela and Trinidad up through Colombia, Central America, and Mexico, also in western Texas, New Mexico, Utah, and Arizona. North populations migrate south in nonbreeding season.	Nature Serve (2015): Considered stable but precarious. Audubon (2017): Possibly 250 breeding pairs in the U.S.

[24] USFWS. 2017. American Peregrine Falcon. ECOS page. Available at https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B01H. Accessed January 31, 2017.
[25] USFWS. 2003. Monitoring results for breeding American peregrine falcons (Falco peregrinus anatum), 2003. Biological Technical Publication. 36 pp.
[26] USFWS. 2010. Attwater's prairie-chicken (Tympanuchus cupido attwateri) recovery plan, second revision. April 26, 2010. Federal Register 75(79):21649-21650.
[27] USFWS. 2006. Estimated number of bald eagle breeding pairs (by state). Available at https://www.fws.gov/midwest/eagle/population/pdf/be_prsmap_wo2006.pdf. Accessed January 31, 2017.
[28] All About Birds. 2017. Black Rail. Available at https://www.allaboutbirds.org/guide/Black_Rail/id. Accessed February 28, 2017.
[29] USFWS. 2011. 12-month finding on a petition to list the cactus ferruginous pygmy-owl as threatened or endangered with critical habitat; proposed rule.
[30] Audubon. 2017. Common Black Hawk. Available at http://www.audubon.org/field-guide/bird/common-black-hawk. Accessed February 1, 2017.

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39.	*Numenius borealis*	Eskimo curlew	Birds	Terrestrial	Yes	E	No	E	GH	SH	Nature Serve (2015): Found along beaches but rarely near water.	Nature Serve (2015): Migratory: Along the Mississippi including eastern half of Texas and the Gulf of Mexico. Nonbreeding: South America; Breeding: Canada and possibly Alaska.	Nature Serve (2015): Believed to be extinct.
40.	*Setophaga chrysoparia*	Golden-cheeked warbler	Birds	Terrestrial	Yes	E	No	E	G2	S2B	Nature Serve (2015): Breeds in mature growth Ashe juniper (*Juniperus ashei*)-oak woodlands. Winters in pine-oak woodlands.	Nature Serve (2015): Breeds in North-Central to Central Texas along the eastern and south-central portions of the Edwards Plateau. Winters in Mexico, Guatemala, Honduras and Nicaragua.	Nature Serve (2015): Approximately 10,000 to 100,000 individuals.
41.	*Vermivora chrysoptera*	Golden-winged warbler	Birds	Terrestrial	Nature Serve (2015): Yes	Petitioned for Listing: 90 Day Substantial	No	Vulnerable	G4	S3	Nature Serve (2015): Breeds in deciduous woodland, overgrown pastures; powerline rights-of-ways; in migration and winter in various open woodland habitats, pine-oak, and scrub.	Nature Serve (2015): Breeding range extends from small portion of southern Canada southeast into the U.S.; migratory states include most of central and south U.S., including east Texas and its Gulf Coast. Nonbreeding resident in Central and South America. Does not nest or overwinter in Texas.	Nature Serve (2015): Approximately 100,000 to 1,000,000 individuals.
42.	*Buteo plagiatus (syn. Asturina nitida)*	Gray hawk	Birds	Terrestrial	Yes[31]	-	No	T	GNR	S2B	Nature Serve (2015): Found in river-edge forest, gallery forest, tropical deciduous forest, and tropical lowland evergreen forest edges. TPWD (2017): Occurs in semiarid mesquite and scrub grasslands and nearby mature riparian woodlands.	Nature Serve (2015): Northwestern Costa Rica through Middle American and into southern Texas, rarely in west Texas and New Mexico, resident of southern Arizona.	All About Birds (2017): Breeding population of 2 million, very restricted in U.S. range but fairly numerous throughout southern range into Argentina.
43.	*Sterna antillarum athalassos*	Interior least tern[32]	Birds	Riparian	Yes	E	No	E	G4T2Q	S1B	TPWD (2017): Found in sand, gravel and shell beaches, sandbars, salt flats; avoid thick vegetation and prefer open habitat.	USFWS (2013)[33]: Large river habitats in Mississippi, Louisiana, Texas, New Mexico, Oklahoma, Arkansas, Kansas, Nebraska, Colorado, Iowa, and the Dakotas. TPWD (2017): In Texas, at reservoirs along the Rio Grande, Canadian, and Red Rivers.	USFWS (2013): Estimated 1,400 to 1,800 adults at time of listing, additional 2,000 added since than; recommended delist.
44.	*Tympanuchus pallidicinctus*	Lesser prairie-chicken	Birds	Terrestrial	No	Petitioned for Listing as E with Critical Habitat: 90 Day Substantial	Petitioned	-	G3	S2B	Nature Serve (2015): Occurs in grasslands.	Nature Serve (2015): Colorado, Kansas Oklahoma, New Mexico, and western Texas.	Nature Serve (2015): Approximately 10,000 to 100,000 individuals (in Texas 6,077 to 24,132).
45.	*Strix occidentalis lucida*	Mexican spotted owl	Birds	Terrestrial	No	T	Designated- not in TX	T	G3G4T3T4	S1B	Nature Serve (2015): Found in rocky-canyon and forested habitats.	Nature Serve (2015): Central Mexico north to western Texas (Guadalupe mountains), New Mexico, Arizona, Colorado, and Utah.	Nature Serve (2015): Approximately 1,000 to 10,000 individuals.
46.	*Falco femoralis septentrionalis*	Northern aplomado falcon	Birds	Terrestrial	No	E, Petitioned for Critical Habitat: Findings Not Yet Made	Petitioned	E	G4T2	S1	USFWS (2014)[34]: Found in variable habitat, but must have open terrain with scattered trees, low ground cover, and nesting trees.	Nature Serve (2015): Southern Texas, Arizona, New Mexico, and south through Mexico and Guatemala.	USFWS (2014): 28-36 breeding pairs in Texas.
47.	*Camptostoma imberbe*	Northern beardless-tyrannulet	Birds	Terrestrial	No[35]	-	No	T	G5	S3B	Nature Serve (2015): Found in open riparian woodlands, thickets, arid scrubs, forest edges, and mesquite.	Nature Serve (2015): Breeding range includes northern Costa Rica up through Middle America and Mexico, into southern Texas, New Mexico, and southeastern Arizona. Nonbreeding range extends from northern Mexico throughout the southern breeding range.	Audubon (2017)[36]: Population has declined in the southwest but still locally common.

[31] All About Birds. 2017. Gray Hawk. Available at https://www.allaboutbirds.org/guide/Gray_Hawk/id. Accessed February 1, 2017.
[32] U.S. Department of Agriculture (USDA). 2015. Least tern *Sternula antillarum* fact sheet. Natural Resources Conservation Service.
[33] USFWS. 2013. 5 Year Review of Interior Least Tern. Jackson, Mississippi. 75 pp.
[34] USFWS. 2014. Northern Aplomado Falcon 5 Year Review. Albuquerque, New Mexico. 46 pp.
[35] Cornell Lab. 2017. *Camptostoma imberbe*. Available at http://neotropical.birds.cornell.edu/portal/species/overview?p_p_spp=420361. Accessed January 31, 2017.
[36] Audubon. 2017. Northern Beardless Tyrannulet. Available at http://www.audubon.org/field-guide/bird/northern-beardless-tyrannulet. Accessed January 31, 2017.

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48.	*Charadrius melodus*	Piping plover	Birds	Marine or Freshwater Aquatic	Yes	T	Designated- Cameron, Willacy, Kenedy, Kleberg, Nueces, Aransas, Calhoun, Matagorda, Galveston, San Patricio, and Brazoria Counties, Texas	T	G3	S2	Nature Serve (2015): Breeding habitat includes sparsely vegetated shores and islands of shallow ponds, lakes, impoundments, and rivers, as well as sandy upper beaches specifically with scattered grass. Nonbreeding habitat includes sand or algal flats in protected bays or ocean beaches.	Nature Serve (2015): Breeding range from Oklahoma through Nebraska, Minnesota, Iowa, Colorado, Dakotas, Montana, and into the northern Great Plains region of Canada. Nonbreeding range includes the Atlantic coast of the southern U.S. and coasts of the Gulf of Mexico and Caribbean.	Nature Serve (2015): Approximately 2,500 to 10,000 individuals.
49.	*Calidris canutus rufa*	Red knot	Birds	Terrestrial	Yes	T	No	-	G4T2	SNRN	USFWS (2014)[37]: Often found along cobble, gravel, or sandy beaches, salt marshes, tidal mudflats, peat banks, shallow coastal impoundments and lagoons.	Nature Serve (2015): Nests in the Arctic Circle and migrates to South America for wintering. USFWS (2014): Can be found in Texas in both spring, fall, and winter. Birds wintering in Texas use a central, overland flyway across midcontinental U.S.	Nature Serve (2015): Approximately 10,000 to 100,000 individuals.
50.	*Picoides borealis*	Red-cockaded woodpecker	Birds	Terrestrial	No	E	No	E	G3	S2B	Nature Serve (2015): Occurs in open, mature pine woodlands, rarely deciduous woodlands.	Nature Serve (2015): Coastal Plain from Maryland to Texas, and inland from Oklahoma to Virginia.	USFWS (2003)[38]: 14,068 individuals estimated.
51.	*Amazona viridigenalis*	Red-crowned parrot	Birds	Terrestrial	No	Candidate	No	-	G2	S2	Nature Serve (2015): Occurs in suburban areas where introduced.	Nature Serve (2015): Resident to northeastern Mexico; introduced in Florida and Hawaii; rare winter visitor to Texas. Lockwood and Freeman (2014): Common year-round resident in urban areas of Lower Rio Grande Valley, particularly Cameron and Hidalgo Counties.	Nature Serve (2015): Approximately 2,500 to 10,000 individuals.
52.	*Egretta rufescens*	Reddish egret	Birds	Terrestrial	No[39]	-	No	T	G4	S3B	TPWD (2017): Nests on dry coastal islands of brushy thickets of prickly pear (*Opuntia sp.*) and yucca (*Yucca sp.*). Found in shallow salt ponds, tidal flats, and brackish marshes.	Nature Serve (2015): Breeding range from Bahamas and Yucatan coast up through Florida, Alabama, Louisiana, and Gulf coast of Texas, and California. Nonbreeding primarily in coastal regions of the breeding range to as far south as Puerto Rico and the Caribbean.	Nature Serve (2015): Approximately 2,500 to 100,000 individuals.
53.	*Pachyramphus aglaiae*	Rose-throated becard	Birds	Terrestrial	No[40]	-	No	T	G4G5	S1	Nature Serve (2015): Breeding habitat consists of mostly semi-arid regions, but occasionally humid areas with woodland, open forest, scrubby areas, and open areas with scattered trees. Nonbreeding habitat includes undisturbed tropical deciduous forests to second growth.	Nature Serve (2015): Breeding range includes Costa Rica and Mexico up through south Texas and Arizona. Nonbreeding includes north Mexico and south through the breeding range. Lockwood and Freeman (2014): Rare and irregular visitor to Lower Rio Grande Valley.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
54.	*Sterna fuscata*	Sooty tern	Birds	Terrestrial	Yes[41]	-	No	T	G5	S2B	Nature Serve (2015): Mostly found across warm oceans.	Lockwood and Freeman (2014): Rare and local summer resident along central and lower coasts of Texas.	Nature Serve (2015): Approximately 100,000 to >1,000,000 individuals.
55.	*Empidonax traillii extimus*	Southwestern willow flycatcher	Birds	Terrestrial	Yes	E, Petitioned for Delisting: 90 Day Substantial	Designated- not in TX	E	G5T2	S1B	Nature Serve (2015): Found in riparian and wetland thickets with willow (*Salix sp.*) and/or tamarisk (*Tamarisk sp.*).	Nature Serve (2015): Breeding range includes portions of California, Nevada, Utah, Colorado, Arizona, New Mexico, western Texas and northwestern Mexico Winter range from central Mexico to northwestern Colombia.	Nature Serve (2015): Estimated 2,600 individuals.

[37] USFWS. 2014. Rufa red knot background information and threats assessment. Supplement to endangered and threatened wildlife and plants; final threatened status for the rufa red knot (Calidris canutus rufa) [Docket No. FWS-R5-ES-2013-0097; RIN AY17]. Pleasantville, New Jersey
[38] USFWS. 2003. Recovery plan for the red-cockaded Woodpecker (Picoides borealis) second revision. Atlanta, GA. 316 pp.
[39] Audubon. 2017. Reddish Egret. Available at http://www.audubon.org/field-guide/bird/reddish-egret. Accessed January 17, 2017.
[40] Audubon. 2017. Rose-throated becard. Available at http://www.audubon.org/field-guide/bird/rose-throated-becard. Accessed January 31, 2017.
[41] Audubon. 2017. Sooty Tern. Available at http://www.audubon.org/field-guide/bird/sooty-tern. Accessed February 1, 2017.

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Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
56.	*Elanoides forficatus*	Swallow-tailed kite	Birds	Terrestrial	Yes[42]	-	No	T	G5	S2B	Nature Serve (2015): Require tall trees and open areas for foraging, often avoid arid areas. TPWD (2017): Found in marshes, along rivers, ponds, and lakes, also in lowland forested regions with swampy areas, ranging into open woodlands.	Nature Serve (2015): Brazil, Paraguay, Peru, Bolivia, and up through Central American and Mexico to east Texas, Louisiana, Florida, and into South Carolina.	Nature Serve (2015): Approximately 100,000 to 1,000,000 individuals.
57.	*Peucaea botterii texana*	Texas Botteri's sparrow	Birds	Terrestrial	Yes	-	No	T	G4T4	S3B	TPWD (2017): Found in short-grass plains and grasslands with scattered shrubs, bushes, yucca, sagebrush (*Artemisia tridentata*), or mesquite.	Miller et al (2013)[43]: Breeds from Veracruz, Mexico north through Copano Bay and the Rio Grande in Texas, and along the Gulf of Mexico.	Insufficient Information found.
58.	*Setophaga pitiayumi*	Tropical parula	Birds	Terrestrial	Yes[44]	-	No	T	G5	S3B	Nature Serve (2015): Found in low deciduous woodlands to high rain forests, mostly restricted to subtropical altitudes or latitudes, and absent from sea-level in the Tropical zone.	Nature Serve (2015): From South America north to Mexico and southern Texas, including Kennedy, Hidalgo, Brooks, and Willacy Counties Lockwood and Freeman (2014): Rare to uncommon resident in live oak woodlands of Brooks and Kenedy Counties; rare to uncommon summer resident of western Edwards Plateau.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
59.	*Coccyzus americanus*	Western yellow-billed cuckoo	Birds	Terrestrial	Yes	T	Designated- parts of Hudspeth, and Brewster Counties	-	G5T2T3	S4S5B	Nature Serve (2015): Generally breed in deciduous riparian woodlands, especially including cottonwood (*Populus deltoides*) and willow but with some mesquite and salt-cedar (tamarisk). Found in various forests, woodlands, and scrubs, during the nonbreeding season.	Nature Serve (2015): Nests in extreme western Texas. Possible subspecies in West Texas, DPS boundary along mountain ranges to the Big Bend area to the western boundary of the Pecos River drainage.	Nature Serve (2015): Approximately 1,000 to 10,000 individuals.
60.	*Plegadis chihi*	White-faced ibis	Birds	Terrestrial	Yes- But found in Texas all year round[45]	-	No	T	G5	S4B	Nature Serve (2015): Found in mostly freshwater habitats of river, marshes, swamps, and ponds.	Nature Serve (2015): Breeding range includes South America through Mexico up through western U.S.to Florida, Louisiana, Alabama, and Texas. Locally from California, Idaho, Oregon, Montana, North Dakota and formerly Minnesota. Nonbreeding range is California, southern Texas, Louisiana and south through South America breeding range.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
61.	*Geranoaetus (syn. Buteo) albicaudatus*	White-tailed hawk	Birds	Terrestrial	No[46]	-	No	T	G4G5	S4B	Nature Serve (2015): Rarely found in open forest, more common in open country, savanna, prairie, and arid habitats with cacti, mesquite, and bushes. TPWD (2017): Found on cordgrass flats, scrub-live oak, and prairies near the coast.	Nature Serve (2015): South American (Bolivia, Peru, Argentina, Venezuela, and Colombia) north through Sonora, Durango, Zacatecas, and central and southeastern Texas, formerly in Arizona.	All About Birds (2017): Population stable or increasing with an estimate of nearly 2 million birds.
62.	*Grus americana*	Whooping crane	Birds	Wetland	Yes	E	Designated- Aransas, Refugio, and Calhoun counties	E	G1	S1	Nature Serve (2015): Habitat during migration and winter includes shallow water of marshes, lakes, lagoons, salt flats, harvested grain fields, and barrier islands.	USFWS (2016)[47]: Primarily breed in Canada and migrate to Texas coast; the other migratory population is introduced and migrates between Wisconsin and Florida, there is also a non-migratory flock in Florida and another in Louisiana.	USFWS (2015)[48]: 603 individuals estimated.

[42] Hipes, D., D.R. Jackson, K. NeSmith, D. Printiss, A. Brandt. 2001. Field guide to the rare animals of Florida. Florida Natural Areas Inventory. Tallahassee, Florida.
[43] Miller, K.S., E.M. McCarthy, M.C. Woodin, and K. Withers. 2013. Nest success and reproductive ecology of the Texas Botteri's sparrow in exotic and native grasses. *Southeastern Naturalist* 12(2): 387-398.
[44] Audubon. 2017. Tropical Parula. Available at http://www.audubon.org/field-guide/bird/tropical-parula. Accessed January 31, 2017.
[45] All About Birds. 2017. White-faced Ibis. Available at https://www.allaboutbirds.org/guide/White-faced_Ibis/id. Accessed January 17, 2017.
[46] All About Birds. 2017. White-tailed Hawk. Available at https://www.allaboutbirds.org/guide/White-tailed_Hawk/id. Accessed February 1, 2017.
[47] USFWS. 2016. Report on Whooping Crane Recovery Activities. Available at https://www.fws.gov/uploadedFiles/WC%20Recovery%20Activities%20Report_Sept-April%202016_Appendices.pdf. Accessed February 27, 2017.
[48] USFWS. 2015. Whooping Crane. Current whooping crane populations (as of February 2015). Available at https://www.fws.gov/refuge/Quivira/wildlife_and_habitat/whooping_crane.html. Accessed February 27, 2017.

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63.	*Mycteria americana*	Wood stork	Birds	Terrestrial	Yes[49]	T	No	T	G4	SHB, S2N	Nature Serve (2015): Found near brackish wetlands, swamps, marshes, lagoons, ponds, and flooded fields with chiefly freshwater.	Nature Serve (2015): South America including Peru, Bolivia, Argentina, and Ecuador up through the Atlantic Coast including South Carolina and Florida, as well as Cuba; post-breeding visitors to Texas from Mexico.	Nature Serve (2015): Approximately 10,000 to 1,000,000 individuals. TPWD (2017): No breeding records in Texas since 1960.
64.	*Buteo albonotatus*	Zone-tailed hawk	Birds	Terrestrial	Yes[50]	-	No	T	G4	S3B	Nature Serve (2015): Prefer open deciduous or pine-oak woodlands of open arid country. TPWD (2017): Found along wooded canyons and tree-lined rivers of middle-slopes of desert mountains, often near watercourses.	Nature Serve (2015): California east through western Texas then extends south through much of South America.	All About Birds (2017): Populations increasing, with estimate of 2 million in breeding population.
65.	*Gammarus hyalelloides*	Diminutive amphipod	Crustaceans	Shallow Aquifer / Spring Aquatic	No	E	Designated- Reeves and Jeff Davis County, Texas	-	G1	S1	Nature Serve (2015): Found in desert spring outflow channels on substrates with interstitial spaces and within gravels and underneath rocks, commonly in microhabitats with flowing water. In springs with warm water and mineralized of sulfo-chloride type water being issued from a cave.	Nature Serve (2015): Known only from the Toyah Basin of the Pecos River drainage in Texas.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
66.	*Orconectes maletae*	Kisatchie painted crayfish	Crustaceans	Freshwater Aquatic	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G2	S2	Nature Serve (2015): Occurs in leaf litter in freshwater; streams.	Nature Serve (2015): Texas and Louisiana.	Nature Serve (2015): Approximately 1,000 to 10,000 individuals.
67.	*Stygobromus pecki*	Peck's cave amphipod	Crustaceans	Shallow Aquifer / Spring Aquatic	No	E	Designated- Comal and Hays County, Texas	E	G1G2	S1	Nature Serve (2015): Occurs in subterranean springs.	Nature Serve (2015): Only found in Texas; known from Comal and Hueco Springs in Comal County.	Nature Serve (2015): Approximately 250 to 1,000 individuals.
68.	*Gammarus pecos*	Pecos amphipod	Crustaceans	Shallow Aquifer / Spring Aquatic	No	E	Designated- Pecos County, Texas	-	G1	S1	Nature Serve (2015): Occurs in spring or spring brook.	Inland Water Crustacean Specialist Group (1996)[51]: Diamond Y Spring and Leon Creek near Fort Stockton in Pecos County, Texas.	Insufficient Information found.
69.	*Notropis girardi*	Arkansas River shiner	Fishes	Freshwater Aquatic	No	T	Designated- not in Texas	T	G2	S2	Nature Serve (2015): Found in unshaded, shallow, turbid river channels with silt and sand substrates.	Nature Serve (2015): Canadian River in Oklahoma, Texas, and New Mexico and the Pecos River in New Mexico.	Nature Serve (2015): Unknown adult population, collected at 23 sites across range.
70.	*Macrhybopsis tetranema*	Peppered chub	Fishes	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	-	G1	S1	Nature Serve (2015): Found in shallow, continuously flowing, perennial streams.	Nature Serve (2015): Texas, New Mexico, Kansas, and Oklahoma.	Nature Serve (2015): 40 collection sites in two river extant in.
71.	*Gambusia gaigei*	Big Bend gambusia	Fishes	Freshwater Aquatic	No	E	No	E	G1	S1	Nature Serve (2015): Found in warm, freshwater, spring-fed vegetated sloughs, ponds, and marshes.	Nature Serve (2015): Only found in Texas in springs of the Big Bend National Park.	Nature Serve (2015): Approximately 2,500 to 10,000 individuals.
72.	*Percina maculata*	Blackside darter	Fishes	Freshwater Aquatic	No[52]	-	No	T	G5	S1	Nature Serve (2015): Prefers quiet pools or pools with some current with sand or gravel bottoms, also in creeks and small to medium rivers.	Nature Serve (2015): Southern Canada and New York to Louisiana, Gulf drainages of Alabama, and the Neches River of the Sabine River drainage in Texas. TPWD (2017): Cypress, Red, and Sulfur River basins.	Nature Serve (2015): Approximately 100,000 to >1,000,000 individuals.
73.	*Gambusia senilis*	Blotched gambusia	Fishes	Freshwater Aquatic	No	-	No	T	G3G4	SX	Nature Serve (2015): Found in marshes, outflows, backwaters, springs, stream channels and edges.	Nature Serve (2015): In the Rio de Sauz basin, Chihuahua and Durango, Mexico, Rio Conchos and tributaries, and formerly in the Devils River, Texas.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.

[49] USFWS. 2005. Wood stork *Mycteria americana*. Jacksonville, FL. 3 pp.
[50] All About Birds. 2017. Zone-tailed Hawk. Available at https://www.allaboutbirds.org/guide/Zone-tailed_Hawk/id. Accessed February 1, 2017.
[51] Inland Water Crustacean Specialist Group. 1996. Gammarus pecos. The IUCN Red List of Threatened Species 1996: e.T8904A12937683. Available at http://dx.doi.org/10.2305/IUCN.UK.1996.RLTS.T8904A12937683.en. Downloaded on 27 January 2017.
[52] Fuller, P. and M. Neilson. 2017. *Percina maculata*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. Available at https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=823 Revision Date: 8/8/2011. Accessed January 31, 2017.

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74.	*Cycleptus elongatus*	Blue sucker	Fishes	Freshwater Aquatic	No	-	No	T	G3G4	S3	Nature Serve (2015): Occurs in impoundments as well as channels and flowing pools with a moderate current.	Nature Serve (2015): Mississippi River basin of Wisconsin and Minnesota, Missouri river drainage of the Dakotas and Montana, formerly in Ohio River drainage in Pennsylvania, Tennessee River basin of Alabama and Tennessee, and also in the Gulf Slope drainages of the Sabine River to the Rio Grande/Pecos River in Texas, New Mexico, and Mexico.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
75.	*Pteronotropis hubbsi*	Bluehead shiner	Fishes	Freshwater Aquatic	Yes-locally (NatureServe 2015)	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	T	G3	S1	Nature Serve (2015): Found in tannin-stained freshwater creeks, rivers, and shallow lakes which are highly vegetated with sand or sand/mud substrate.	Nature Serve (2015): Northeast Texas, southeast Oklahoma, and Arkansas.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
76.	*Notropis simus simus*	Bluntnose shiner	Fishes	Freshwater Aquatic	-	-	No	T	G2TX	SX	Nature Serve (2015): Often found below obstructions in main river channels with sand, silt, or gravel substrates.	Nature Serve (2015): Historically found in New Mexico, Mexico, Pecos River, and the upper Rio Grande in Texas.	Nature Serve (2015): Approximately 10,000 to 100,000 individuals.
77.	*Ictalurus sp. 1*	Chihuahua catfish	Fishes	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	-	G1G2	S1	Nature Serve (2015): Occurs in freshwater, benthic habitat.	Nature Serve (2015): Texas and New Mexico. Cibolo-Red Light, Black Hills-Fresno, and Big Bend watersheds.	Insufficient Information found.
78.	*Notropis chihuahua*	Chihuahua shiner	Fishes	Freshwater Aquatic	-	-	No	T	G3	S2	Nature Serve (2015): Prefer clear, cool water associated with nearby springs, found in channels of large creeks and small to medium rivers, as well as pools with slight current or gravel or sand bottom riffles with vegetation.	Nature Serve (2015): Near the mouth of Rio Conchos and lower Pecos River, Texas, also in the Rio Grande drainage and the smaller tributaries of Rio Conchos in Chihuahua and Durango, Mexico.	Nature Serve (2015): Collected from 33 occurrences, including 7 in Texas, the rest in Mexico.
79.	*Gambusia heterochir*	Clear Creek gambusia	Fishes	Freshwater Aquatic	No	E	No	E	G1	S1	Nature Serve (2015): Found in clear springs and outflows with dense vegetation and constant temperature.	Nature Serve (2015): Only found in the impounded headwaters of Wilkinson Springs in Menard County, Texas, in the Upper Clear Creek of the San Saba River system.	Nature Serve (2015): Approximately 1,000 to 10,000 individuals.
80.	*Cyprinodon elegans*	Comanche Springs pupfish	Fishes	Freshwater Aquatic	No	E	No	E	G1	S1	Nature Serve (2015): Occurs in freshwater springs and associated marshes and canals.	Nature Serve (2015): Only in Jeff Davis and Reeves Counties in Texas; found in a small series of springs, their outflows, and a system of irrigation channels interconnecting the following springs: Phantom Lake, San Solomon, Giffin, and Toyah Creek.	Nature Serve (2015): Approximately 10,000 to 100,000 individuals.
81.	*Cyprinodon eximius*	Conchos pupfish	Fishes	Freshwater Aquatic	No	-	No	T	G3G4	S1	Nature Serve (2015): Uncommon in headsprings, often in marshes, backwaters, sloughs, margins of large streams, creek channels, and mouths of creeks tributary to larger rivers.	Nature Serve (2015): In the upper Rio Conchos system and Rio de Sauz basin in Mexico and the Rio Alamo in Chihuahua, also in the Terlingua Creek, Devils River, and Alamito Creek in Texas.	Nature Serve (2015): Approximately 10,000 to 1,000,000 individuals.
82.	*Dionda diaboli*	Devils River minnow	Fishes	Freshwater Aquatic	No	T	Designated- Val Verde and Kinney Counties, Texas	T	G1	S1	Nature Serve (2015): Occupies spring-fed, clear, fast-flowing water over gravel substrate.	Nature Serve (2015): Known from the Devils River, San Felipe Creek, and Pinto Creek in Kinney and Val Verde Counties, Texas.	Nature Serve (2015): Approximately 2,500 to 100,000 individuals.
83.	*Etheostoma fonticola*	Fountain darter	Fishes	Freshwater Aquatic	No	E	Designated- Hays County, Texas	E	G1	S1	Nature Serve (2015): Found in densely vegetated springs, pools, rivers.	Nature Serve (2015): Only in Texas; endemic to the spring-fed upper San Marcos and Comal Rivers of Comal and Hays Counties.	Nature Serve (2015): Approximately 100,000 to 1,000,000 individuals.
84.	*Cyprinodon bovinus*	Leon Springs pupfish	Fishes	Freshwater Aquatic	No	E	Designated- Pecos County, Texas	E	G1	S1	Nature Serve (2015): Found in shallow, calm water of springs, marshes, and pools.	Nature Serve (2015): Leon Creek, a flood tributary of the Pecos River.	Nature Serve (2015): Approximately 2,500 to 10,000 individuals.
85.	*Prietella phreatophila*	Mexican blindcat	Fishes	Freshwater Aquatic	No	E	No	-	Not ranked	Not ranked	Hendrickson et al. (2017)[53]: Aquifer habitat; deep groundwater passages, hand-dug wells.	Hendrickson et al. (2017): Northern Mexico (Coahuila and Tamaulipas); discovered in Val Verde County, Texas in 2016.	unknown

[53] Hendrickson, D.A., J. Johnson, P. Sprouse, S. Howard, G.P. Garrett, J.K. Krejca, A. Gluesenkamp, J.A. Davila Paulin, L. Dugan, A.E. Cohen, A. Hernandez Espriu, J.P. Sullivan, D.B. Fenolio, J. Karges, R. Smith, F.J. Garcia De Leon, B. Wolaver, J. Reddell. 2017. *Discovery of the Mexican Blindcat,* Prietella phreatophila*, in the U.S., and an update on its rangewide conservation status.* Presentation to Texas Academy of Science. Belton, Texas. 33 pp.

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86.	*Ctenogobius claytonii*	Mexican goby	Fishes	Freshwater Aquatic	No	-	No	T	GNR	S1	Nature Serve (2015): Found in clear to muddy water with moderate to no current, substrates of clay, mud, sand, or gravel, and sparse to no vegetation. Can be in fresh and brackish coastal streams, lagoons, or rivers.	Nature Serve (2015): Laguna de Pajaritos, Veracruz Mexico, up through southern Texas and includes the Atlantic Slope of North America.	Pezold (2015)[54]: Locally common in Veracruz, Mexico, but otherwise uncommon throughout its range. Not recorded from the Rio Grande river in 30 years.
87.	*Campostoma ornatum*	Mexican stoneroller	Fishes	Freshwater Aquatic	No	-	No	T	G3G4	S1	Nature Serve (2015): Adults found in pools over gravel or sand bottoms or flowing segments of pools, undercut banks, or other cover, also in shallow riffles, runs, and pools of clear to slightly turbid, and in small to medium headwaters and creeks.	Nature Serve (2015): Widespread from Big Bend region to Rios Yaqui and Sonora to Nazas-Aquanaval basins in Zacatecas and endorheic systems of Chihuahua, also in Arizona and Rio Grande tributaries of Presidio and Brewster Counties, Texas.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
88.	*Cyprinella sp. 2*	Nueces shiner	Fishes	Freshwater Aquatic	No	Petitioned for Listing: 12 Month Not Warranted	No	-	G1G2Q	S1S2	TPWD (2017)[55]: Found in cool, clear, spring-fed headwater of creeks.	TPWD (2017): In the upper reaches of the Nueces River in Texas.	Insufficient Information found.
89.	*Microphis brachyurus*	Opossum pipefish	Fishes	Aquatic	No	-	No	T	G4G5	S1	Nature Serve (2015): Young live in open ocean then return to fresh water to reproduce.	Nature Serve (2015): Throughout eastern Pacific, tropical Indo-Pacific, Atlantic regions, and the eastern Pacific near the terminus of the Panama Canal.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
90.	*Polyodon spathula*	Paddlefish	Fishes	Freshwater Aquatic	No	-	No	T	G4	S3	Nature Serve (2015): Found in slow-flowing water of river-margin lakes, channels, large and medium-sized rivers, oxbows, backwaters, and impoundments.	Nature Serve (2015): Gulf Slope drainages from Alabama to Galveston Bay, Texas, in the Mississippi River basin from New York to Montana and south to Louisiana.	Nature Serve (2015): Approximately 10,000 to 1,000,000 individuals.
91.	*Gambusia nobilis*	Pecos gambusia	Fishes	Freshwater Aquatic	No	E	No	E	G2	S2	Nature Serve (2015): Found in shallow, clear, vegetated spring waters high in calcium carbonate as well as gypsum sinkhole habitats.	Nature Serve (2015): Texas and New Mexico in the Pecos River basin.	Nature Serve (2015): Estimated at over 1,000,000 individuals.
92.	*Cyprinodon pecosensis*	Pecos pupfish	Fishes	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	T	G2	S1	Nature Serve (2015): Usually found in high saline habitats including springs, gypsum sinkholes, and desert streams.	Nature Serve (2015): New Mexico and Pecos River in Texas.	Nature Serve (2015): Approximately 10,000 to 100,000 individuals.
93.	*Cyprinella lepida*	Plateau shiner	Fishes	Freshwater Aquatic	No	Petitioned for Listing: 12 Month Not Warranted	No	-	G1G2	S1S2	Nature Serve (2015): Occupies clear, cool, springs and spring-fed creeks; usually gravel substrate.	Nature Serve (2015): Only Frio and Sabinal Rivers in central Texas.	Nature Serve (2015): Population size unknown but thought to be small.
94.	*Macrhybopsis australis*	Prairie chub	Fishes	Freshwater Aquatic	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G3	SNR	Nature Serve (2015): Found in creeks and rivers with sand and gravel substrates or in intermittent streams that possibly dry to isolated, salt-encrusted pools.	Nature Serve (2015): Red River basin, Texas Panhandle and along Oklahoma/Texas border.	Nature Serve (2015): Total population size unknown but presumed common.
95.	*Cyprinella proserpina*	Proserpine shiner	Fishes	Freshwater Aquatic	-	-	No	T	G3	S2	Nature Serve (2015): Found in pools and rocky runs of small rivers and creeks.	Nature Serve (2015): Basin of Rio Bravo, San Rodrigo, Rios San Carlos, and Devils River of Coahuila, Mexico; San Felipe, Independence, Pinto, and Las Moras creeks, and the Pecos River of Texas; of the Atlantic slope of North America.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
96.	*Gila pandora*	Rio Grande chub	Fishes	Freshwater Aquatic	No	-	No	T	G3	S1	Nature Serve (2015): Found near inflow of riffles and cover such as undercut banks, plant debris, and aquatic vegetation, also in flowing pools of creeks, headwaters, and small rivers.	Nature Serve (2015): Isolated population in the Davis Mountains, Texas, and was formerly common in creeks of the upper Rio Grande and Pecos River watersheds in New Mexico and Rio Grande and San Luis basin of Colorado.	Nature Serve (2015): Total adult population is unknown, but presumed to be greater than 10,000.
97.	*Etheostoma grahami*	Rio Grande darter	Fishes	Freshwater Aquatic	No	-	No	T	G2G3	S2	Nature Serve (2015): May hide among debris in vegetated pools or gravel and rubble areas, occurs in springs of the Edwards Plateau, clear rocky riffles and pools of small rivers and creeks.	Nature Serve (2015): Headwaters of the Rios San Juan and Salado in Mexico, and in the mainstream and spring-fed tributaries of the lower Pecos River downstream to the Devils River and Dolan, Rio Grande, San Felipe and Sycamore creeks.	Nature Serve (2015): Total population is unknown but common at a few sites in Mexico and Texas, even found to be the most abundant fish in a 10-km stretch below Amistad Reservoir.

[54] Pezold, F. 2015. *Ctenogobius claytonii*. The IUCN Red List of Threatened Species 2015: e.T185968A1796182. Available at http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T185968A1796182.en. Accessed January 31, 2017.
[55] TPWD. 2017. Nueces River Shiner. Available at http://txstate.fishesoftexas.org/cyprinella%20sp.htm. Accessed February 2, 2017.

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98.	*Hybognathus amarus*	Rio Grande silvery minnow	Fishes	Freshwater Aquatic	No	E	Designated - Not in TX	E	G1	SX	Nature Serve (2015): Found in freshwater rivers with slow to moderate flow usually with silt substrates; often found in pools, backwaters or eddies created by debris piles.	Nature Serve (2015): Rio Grande in New Mexico; presumed extirpated from Texas.	Nature Serve (2015): Approximately 10,000 to 100,000 individuals.
99.	*Awaous banana*	River goby	Fishes	Freshwater Aquatic	No	-	No	T	G5	S1	Nature Serve (2015): Found in well-oxygenated waters over sand in flowing stream runs and pools. TPWD (2017): Enters ocean and brackish water, but prefers clear water with sandy or hard bottom and little to no vegetation.	Texas State University (2017)[56]: Gulf and Atlantic coasts of the U.S. south through the west indies, Central America, and to Venezuela, also from Mexico to northern Peru. In Texas found in the Rio Grande in Hidalgo and Cameron counties.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
100.	*Gambusia clarkhubbsi*	San Felipe gambusia	Fishes	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	T	G1	S1	Nature Serve (2015): Occurs in spring-fed streams.	Nature Serve (2015): Only confirmed in San Felipe Creek, Val Verde County, Texas.	Nature Serve (2015): Several 1,000 individuals.
101.	*Gambusia georgei*	San Marcos gambusia	Fishes	Freshwater Aquatic	No	E	Designated- Hays County, Texas	E	GX	SX	Nature Serve (2015): Large, quiet, shallow, sparsely vegetated spring with a mud substrate.	Nature Serve (2015): Once in the San Marcos Spring and the upper San Marcos River in Texas.	Nature Serve (2015): Presumed extinct.
102.	*Notropis oxyrhynchus*	Sharpnose shiner	Fishes	Freshwater Aquatic	No	E	Designated- Baylor, Crosby, Fisher, Garza, Haskell, Kent, King, Knox, Stonewall, Throckmorton, and Young Counties, Texas	-	G3	S3	Nature Serve (2015): Occurs in gravel and sand run of medium to large rivers, and less often in mud-and sand-bottomed pools.	Nature Serve (2015): Historically found throughout the Brazos River, now rare or extirpated downstream of Possum Kingdom Reservoir.	Nature Serve (2015): Approximately 10,000 to 1,000,000 individuals.
103.	*Scaphirhynchus platorynchus*	Shovelnose sturgeon	Fishes	Freshwater Aquatic	No	T- Similarity of appearance to the pallid sturgeon (*Scaphirhynchus albus*)[57]	No	T	G4	S2	Nature Serve (2015): Found over gravel and sand mix or mud areas with strong current in deep channels and embayments or large turbid rivers.	Nature Serve (2015): Missouri, Mississippi, and Ohio rivers and tributaries TPWD (2017): Red River below Lake Texoma.	Nature Serve (2015): Population is unknown but thought to be relatively large.
104.	*Notropis buccula*	Smalleye shiner	Fishes	Freshwater Aquatic	No	E	Designated- Baylor, Crosby, Fisher, Garza, Haskell, Kent, King, Knox, Stonewall, Throckmorton, and Young Counties, Texas	-	G2	S2	Nature Serve (2015): Occurs in the turbid, sandy channels of small to medium rivers.	Nature Serve (2015): Historically occurred throughout the Brazos River proper, Lampasas River, the Double Mountain and Salt Forks of the Upper Brazos River drainage. Possible population through introduction in the Colorado River above Buchanan Reservoir. Species has not been collected from the Lampasas River since 1951 and is likely extirpated from the mainstream of the Brazos River downstream of Possum Kingdom Reservoir.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
105.	*Pristis pectinata*	Smalltooth sawfish	Fishes	Marine Aquatic	Yes[58]	E	No	E	G1G3	SNR	Nature Serve (2015): Found in sheltered bays, on shallow banks and in estuaries; in freshwater and brackish water near river mouths.	Nature Serve (2015): Everglades National Park, including Florida Bay, Georgia and Mississippi; extirpated from Texas.	NMFS (2009): Currently there is no abundance estimate.
106.	*Trogloglanis pattersoni*	Toothless blindcat	Fishes	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	T	G1G2	S1	Nature Serve (2015*):* Found in freshwater, benthic subterranean pools at 1,000–1,900 feet below surface.	Nature Serve (2015*)*: Five artesian wells penetrating the San Antonio Pool of the Edwards Aquifer.	Nature Serve (2013)[59]: Total population unknown but apparently abundant.

[56] Texas State University. 2017. Awaous banana. Fact sheet. Available at http://txstate.fishesoftexas.org/awaous%20banana.htm. Accessed February 28, 2017.
[57] USFWS. 2010. Threatened status for shovelnose sturgeon under the similarity of appearance provisions of the E Species Act. Washington, D.C.
[58] National Marine Fisheries Service (NMFS). 2009. Smalltooth sawfish recovery plan (*Pristis pectinata*). Prepared by the Smalltooth Sawfish Recovery Team for the NMFS. Silvery Spring, Maryland.
[59] NatureServe. 2013. Trogloglanis pattersoni. The IUCN Red List of Threatened Species 2013: e.T22273A19035299. Available at http://dx.doi.org/10.2305/IUCN.UK.2013-1.RLTS.T22273A19035299.en. Downloaded on 02 February 2017.

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Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
107.	*Erimyzon oblongus*	Western Creek chubsucker	Fishes	Freshwater Aquatic	No	-	No	T	G5	S2S3	Nature Serve (2015): Occasionally found in lakes, often near vegetation in silt-, gravel-, or sand-bottomed pools of clear headwaters, small rivers, and creeks. TPWD (2017): Rarely found in springs or impoundments, often in rivulets or marshes, spawning in river mouths or pools, lake outlets, riffles, or upstream creeks.	Nature Serve (2015): Gulf drainages from Georgia to the San Jacinto River in Texas, also in Michigan south to the lower Great Lakes and Mississippi River basins, formerly in Wisconsin.	Nature Serve (2015): Estimated at over 1,000,000 individuals.
108.	*Satan eurystomus*	Widemouth blindcat	Fishes	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	T	G1G2	S1	Nature Serve (2015): Occupies freshwater, benthic, subterranean pools.	Nature Serve (2015): Five artesian wells penetrating the San Antonio Pool of the Edwards Aquifer.	Nature Serve (2015): Population size unknown but may be large.
109.	*Rhadine exilis*	A ground beetle	Insects	Terrestrial Karst	No	E	Designated-Bexar County, Texas	-	G3	S1	Nature Serve (2015): Species is a subterranean obligate.	Nature Serve (2015): Known from 45 to 50 caves in Bexar County, Texas.	Nature Serve (2015): Unknown population estimate.
110.	*Rhadine infernalis*	A ground beetle	Insects	Terrestrial Karst	No	E	Designated-Bexar County, Texas	-	G2G3	S1	Nature Serve (2015): Species is a subterranean obligate.	Nature Serve (2015): Known from 36 to 39 caves in Bexar County, Texas.	Nature Serve (2015): Unknown population estimate.
111.	*Nicrophorus americanus*	American burying beetle	Insects	Terrestrial	No	E, Petitioned for Delisting: 90 Day Substantial	No	-	G2G3	S1	USFWS (2014)[60]: Found in soils conducive to excavation, but otherwise considered a habitat generalist.	Nature Serve (2015): Rhode Island, Oklahoma, Nebraska, South Dakota, Arkansas, and northeast Texas.	Nature Serve (2015): Approximately 1,000 – 2,500 individuals.
112.	*Batrisodes texanus*	Inner Space Cavern mold beetle	Insects	Terrestrial Karst	No	E	No	-	G2	SNR	Nature Serve (2015): Species is a subterranean obligate. TPWD (2017): Observed in small Edwards Limestone caves.	TPWD (2017): Known from caves in Travis and Williamson Counties.	Nature Serve (2015): Found in 8 caves.
113.	*Batrisodes cryptotexanus*	Dragonfly Cave mold beetle	Insects	Terrestrial Karst	No	-	No	-	G2	SNR	Nature Serve (2015): Species is a subterranean obligate. TPWD (2017): Observed in small Edwards Limestone caves.	Nature Serve (2016): Only known from caves in Williamson County, Texas.	Nature Serve (2016): Found in 8 caves.
114.	*Stygoparnus comalensis*	Comal Springs dryopid beetle	Insects	Shallow Aquifer / Spring Aquatic	No	E	Designated-Comal and Hays Counties, Texas	E	G1G2	S1	TPWD (2017): Benthic stream adults found on stream bottom or crawling along shores; larvae are vermiform and live in soil or decaying wood.	Nature Serve (2015): Only found in Texas in Comal and Fern Bank Springs in Hays County.	Nature Serve (2015): Population size unknown, but collected from only two, likely connected, sites.
115.	*Heterelmis comalensis*	Comal Springs riffle beetle	Insects	Shallow Aquifer / Spring Aquatic	No	E	Designated-Comal and Hays Counties, Texas	E	G1	S1	Nature Serve (2015): Occurs in gravel substrates and shallow riffles in springs.	Nature Serve (2015): Endemic to Texas; found primarily in Comal Springs, Comal County, however a single specimen was discovered in in San Marcos Springs, Hays County.	Nature Serve (2015): Approximately 50 to 2,500 individuals.
116.	*Haideoporus texanus*	Edwards Aquifer diving beetle	Insects	Shallow Aquifer / Spring Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	-	G1G2	S1	Nature Serve (2015): Occurs in caves and small crevices.	Nat Nature Serve (2015): Occupies the San Marcos pool of Edwards Aquifer.	Nature Serve (2015): Approximately 2,500 to 10,000 individuals.
117.	*Batrisodes venyivi*	Helotes mold beetle	Insects	Terrestrial Karst	No	E	Designated-Bexar County, Texas	-	G1	S1	Nature Serve (2015): Species is a subterranean obligate.	TPWD (2017): Karst features in Bexar and Medina Counties.	Nature Serve (2015): Found in 8 caves.
118.	*Texamaurops reddelli*	Kretschmarr Cave mold beetle	Insects	Terrestrial Karst	No	E	No	-	G1G2	S1	Nature Serve (2015): Found lightly buried in silt, under rocks in total darkness of small isolated caves in the Edwards Limestone Formation.	Nature Serve (2015): Jollyville section of the Edwards Plateau within Kretschmarr, Amber, and Tooth caves of Travis County, Texas.	Nature Serve (2015): Approximately 1 to 1,000 individuals.
119.	*Automeris louisiana*	Louisiana eyed silkmoth	Insects	Aquatic / Terrestrial	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G1G3	SNR	Nature Serve (2015): Occurs in herbaceous wetlands.	Nature Serve (2015): Mississippi, southeast Texas, and coast of Louisiana.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
120.	*Danaus plexippus plexippus*	Monarch butterfly	Insects	Terrestrial	Yes	Petitioned for Listing T with Critical Habitat: 90 Day Substantial	Petitioned	-	G4	S4B	Nature Serve (2015): Breeding areas include patches of milkweed; utilize coastal migratory stopovers.	Nature Serve (2015): Summer breeding habitat in 48 states of the U.S., southern Canada, Australia, and New Zealand. Overwinter in the mountains of Mexico.	Nature Serve (2015): Estimated at over 1,000,000 individuals (70%-90% decline).

[60] USFWS. 2014. American Burying Beetle. Tulsa, Oklahoma. 29 pp.

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Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
121.	*Lepidostoma morsei*	Morse's little plain brown sedge	Insects	Aquatic / Terrestrial	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G2G3	SNR	Nature Serve (2015): Found in dead plant detritus in freshwater, flowing streams and springs.	Nature Serve (2015): Found in Texas, Mississippi, Florida, and New Jersey.	Nature Serve (2015): Approximately 1 to 1,000 individuals.
122.	*Somatochlora margarita*	Texas emerald	Insects	Aquatic / Terrestrial	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G2	S2	Nature Serve (2015): Adults are river-breeding. TPWD (2016)[61]: Found in streams and bogs; pitcher-plant bogs	Nature Serve (2015): East Texas to central Louisiana. TPWD (2016): Known from nine Texas counties and may be the most common dragonfly in areas where it occurs (although it is rarely seen).	Nature Serve (2015): Approximately 2,500 to 10,000 individuals.
123.	*Lirceolus smithii*	Texas troglobitic water slater	Insects	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	-	G1G2	S1	Nature Serve (2015): Occurs in subaquatic; underground in aquifer.	Nature Serve (2015): Found in central Texas.	Nature Serve (2015): Approximately 2,500 to 10,000 individuals.
124.	*Rhadine persephone*	Tooth Cave ground beetle	Insects	Terrestrial Karst	No	E	No	-	G1G2	S1	Nature Serve (2015): Prefers deep uncompacted silt in small isolated karst caves of the Edwards Limestone Formation.	Nature Serve (2015): Currently along an 8.7-mile distance in Travis and Williamson Counties, Texas, and known from approximately 27 locations.	Nature Serve (2015): Approximately 1 to 1,000 individuals.
125.	*Ursus americanus*	Black bear	Mammals	Terrestrial	No[62]	-	No	T	G5	S3	Nature Serve (2015): Found in forest wetlands, forests and nearby openings.	Nature Serve (2015): North of central Mexico throughout most of North America, except desert regions.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
126.	*Mustela nigripes*	Black-footed ferret	Mammals	Terrestrial	No	E	Designated- Not in TX	-	G1	SX	Nature Serve (2015): Found in grasslands, steppe, and shrub steppe open grasslands, like those used by prairie dogs, use burrows made by prairie dogs (*Cynomys sp.*).	Nature Serve (2015): Formerly included much of the Great Plains, semi-arid grasslands, and mountain basins of North America. Virtually extirpated across former range.	Nature Serve (2015): Approximately 250 to 1,000 individuals.
127.	*Oryzomys couesi*	Coues' rice rat	Mammals	Aquatic / Terrestrial	No	-	No	T	G5	S2	Nature Serve (2015): Found in tree-shaded grassy areas around resaca edge, cattail-bulrush marsh with shallower zone of aquatic grasses near shore.	Nature Serve (2015): Southern Texas (Cameron and Hidalgo Counties) south through Mexico, Central America, and Colombia and Panama, also Isla Cozumel and Jamaica.	Nature Serve (2015): U.S. population estimated at no more than 15,000 in 1979.
128.	*Herpailurus yagouaroundi cacomitli*	Gulf Coast jaguarundi	Mammals	Terrestrial	No	E, Petitioned for Critical Habitat: Findings Not Yet Made	Petitioned	E	G4T3	S1	Nature Serve (2015): Found in thick brushlands near water.	Nature Serve (2015): Southern tip of Texas and Mexico.	USFWS (2013)[63]: No confirmed sightings in Texas since 1986; range-wide estimate unknown.
129.	*Canis lupus*	Gray wolf	Mammals	Terrestrial	No	E	Designated - Not in TX	E	G4G5	SX	Nature Serve (2015): No particular habitat preference. TPWD (2017): Formerly known throughout the western two-thirds of the state in forests, brushlands, or grasslands.	Nature Serve (2015): Presumed extirpated in Texas; apparently secure throughout the majority of Canada, Alaska, Montana and Wisconsin; ranked vulnerable in Idaho, Minnesota, and Michigan; critically imperiled or presumed extirpated throughout central and southern U.S.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
130.	*Panthera onca*	Jaguar	Mammals	Terrestrial	No	E	Designated - Not in TX	E	G3	SH	Nature Serve (2015): Found in subtropical and tropical forests, thorn scrub, lowland scrub and woodland, swampy savanna or mangrove, lagoons, floating islands, or marshlands.	Nature Serve (2015): Occasionally move from Mexico into New Mexico and Arizona; occurs in Mexico, Central American (very rare except Belize), down through South America to northern Argentina TPWD (2017): no reliable Texas sightings since 1952.	Nature Serve (2015): Approximately 10,000 to 1,000,000 individuals.
131.	*Ursus americanus luteolus*	Louisiana black bear	Mammals	Terrestrial	No	Delisted	No	T	G5T2	-	Nature Serve (2015): Requires diverse food resources, including hard-mast-producing species in diverse, productive bottomland forests.	Nature Serve (2015): Presently in the Tensas and Atchafalaya basins in Louisiana, historically in eastern Texas, Louisiana, and southern Mississippi.	Nature Serve (2015): Approximately 1 to 1,000 individuals.
132.	*Leopardus wiedii*	Margay	Mammals	Terrestrial	No	-	No	T	G4	SX	Nature Serve (2015): Found in arboreal terrestrial, prefers heavily forested areas, either evergreen or deciduous.	Nature Serve (2015): Formerly in the southern tip of Texas, currently south through Mexico to Central and South America.	Nature Serve (2015): Approximately 1 to 1,000 individuals.

[61] TPWD. 2016. Texas' Rarest Dragonflies Tied to Rare Natural Community, Pitcher-Plant Bogs. TPWD Non-game and Wildlife Diversity Program. Austin, Texas. https://texasnongameprogram.wordpress.com/2016/02/09/texas-rarest-dragonflies-closely-tied-to-rare-natural-community-pitcher-plant-bogs/. Accessed March 15, 2017.
[62] TPWD. 2017. Black Bear. Available at http://tpwd.texas.gov/huntwild/wild/species/blackbear/. Accessed January 30, 2017.
[63] USFWS. 2013. Gulf coast jaguarondi recovery plan. Albuquerque, New Mexico. 70 pp.

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133.	*Leptonycteris nivalis*	Mexican long-nosed bat	Mammals	Terrestrial	Yes[64]	E	No	E	G3	S1	Nature Serve (2015): Roost in caves, mines, hollow trees, and abandoned buildings; vegetation types include desert scrub, pine forests, and open conifer-oak woodlands; generally arid areas where agave plants grow.	Nature Serve (2015): Southwestern Texas and New Mexico, and northern and central Mexico. TPWD (undated)[65]: Occurs in southwestern New Mexico, the Big Bend area of Texas, the Chinati Mountains of Presidio County, Texas and southward to central Mexico.	Nature Serve (2015): Approximately 10,000 to 1,000,000 individuals.
134.	*Leopardus pardalis*	Ocelot	Mammals	Terrestrial	No	E, Petitioned for Critical Habitat: Findings Not Yet Made	Petitioned	E	G4	S1	Nature Serve (2015): In Texas: found in dense chaparral thickets. In other areas: found in tropical forests, mangrove forests, swampy savannas, brushland.	Nature Serve (2015): Texas, Louisiana, Arkansas, and Arizona; south through Mexico, Central America, and much of South America.	Nature Serve (2015): Unknown total population, but 80 to 120 in Texas.
135.	*Peromyscus truei comanche*	Palo Duro mouse	Mammals	Terrestrial	No	-	No	T	G5T2	S2	TPWD (2017): Found in woodlands in canyon country, rocky, juniper-mesquite covered slopes of steep-walled canyons of the Llano Estacado.	TPWD (2017)[66]: Randall, Armstrong, and Briscoe Counties.	Insufficient Information found.
136.	*Corynorhinus rafinesquii*	Rafinesque's big-eared bat	Mammals	Terrestrial	No[67]	-	No	T	G3G4	S3	TPWD (2017): Often found in abandoned man-made structures, culverts, or cavity trees of bottomland hardwoods.	Nature Serve (2015): Known primarily from the Gulf Coastal Plain, but from Florida to Virginia across to Illinois, and west to eastern Texas, Oklahoma, Arkansas, and Missouri.	Nature Serve (2015): Approximately 10,000 to 100,000 individuals.
137.	*Canis rufus*	Red wolf	Mammals	Terrestrial	No	E	No	E	G1Q	SX	Nature Serve (2015): Habitat generalists and includes the following if heavy vegetative cover exists: upland and lowland forests, shrublands, and coastal prairies and marshes.	Nature Serve (2015): Reintroduced and In the wild in North Carolina and in propagation populations on two islands in South Carolina and Florida; extirpated from Texas.	Nature Serve (2015): Approximately 100 in the wild in North Carolina and approximately 165 in captivity.
138.	*Lasiurus ega*	Southern yellow bat	Mammals	Terrestrial	Yes[68]	-	No	T	G5	S1	Nature Serve (2015): Found in a wide range from forest and open habitats, including dry and moist areas TPWD (2017): Often roosts in palm trees (*Arecaceae sp.*).	Nature Serve (2015): South America up through Mexico and southern Texas.	Nature Serve (2015): Approximately 100,000 to 1,000,000 individuals.
139.	*Euderma maculatum*	Spotted bat	Mammals	Terrestrial	Yes-Unknown if Texas population migrates[69]	-	No	T	G4	S2	Nature Serve (2015): Found in desert habitat to montane coniferous forests, including hayfields, pastures, river corridors, canyon bottoms, ponderosa pine (*Pinus ponderosa*) forests, and pinyon-juniper woodlands.	Nature Serve (2015): Central Mexico through western Texas, New Mexico, Arizona, California, Nevada, and up through Colorado, Montana and into British Columbia.	Nature Serve (2015): Approximately 2,500 to 100,000 individuals.
140.	*Dipodomys elator*	Texas kangaroo rat	Mammals	Terrestrial	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	T	G2	S2	Nature Serve (2015): Found in sparsely vegetated areas with sandy, loam clay; along fencerows, heavily grazed areas.	USFWS (2016)[70]: Eleven counties of north-central Texas; formerly occurred and may still be present in two counties of southwest Oklahoma.	Nature Serve (2015): Approximately 1,000 to 10,000 individuals.
141.	*Perimyotis subflavus*	Tri-colored bat	Mammals	Terrestrial	Yes	Petitioned for Listing: Under review	No	-	G2G3	S5	Nature Serve (2015): Found in riparian forests near streams; hibernate in caves and under bridges. TPWD (undated)[71]: Hibernates in caves during winter and forms small maternity colonies of 35 individuals or less in buildings, tree cavities, and rock crevices in summer.	Nature Serve (2015): Canada; eastern and central U.S. (including much of the eastern half of Texas); Mexico and Honduras.	Nature Serve (2015): Approximately 10,000 to 1,000,000 individuals.

[64] Schmidly, D.J., and R.D. Bradley. 2016. The Mammals of Texas, Seventh Edition. University of Texas Press, Austin. 720 pp
[65] TPWD. Undated. Mexican long-nosed based (Leptonycteris nivalis). http://tpwd.texas.gov/huntwild/wild/species/mexlongnose. Accessed March 15, 2017.
[66] TPWD. 2017. Palo Duro Mouse. Available at http://tpwd.texas.gov/huntwild/wild/species/pdmouse/. Accessed January 30, 2017.
[67] Lacki, M.J., and M.L. Bayless. 2013. A conservation strategy for Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) and southeastern myotis (*Myotis austroriparius*). Bat Conservation International. Austin, Texas.
[68] Kurta, A., and G.C. Lehr. 1995. Lasiurus ega. Mammalian Species 515:1-7
[69] Luce, R.J. and D. Keinath. 2007. Spotted bat (*Euderma maculatum*): A technical conservation assessment. Prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project.
[70] USFWS. 2016. Texas kangaroo rat. Fact Sheet. Available at https://www.fws.gov/southwest/es/arlingtontexas/pdf/TKR_FactSheet_20160808.pdf. Accessed February 28, 2017.
[71] TPWD. Undated. Eastern Pipistrelle (*Pipistrellus subflavus*). http://tpwd.texas.gov/huntwild/wild/species/easpip. Accessed March 15, 2017.

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142.	*Trichechus manatus*	West Indian manatee	Mammals	Marine Aquatic	Yes	E, Petitioned for increased protections: Findings Not Yet Made; Petition to Revise Critical Habitat: 90 Day Substantial; Petition for Downlisting: 90 Day Substantial	Designated- not in TX; Petitioned	E	G2	-	Nature Serve (2015): Occurs in shallow coastal waters, estuaries, bays, rivers, and lakes.	Nature Serve (2015): Northern South America, West Indies/Caribbean region, Gulf of Mexico, Florida.	Nature Serve (2015): Population size unknown.
143.	*Nasua narica*	White-nosed coati	Mammals	Terrestrial	No[72]	-	No	T	G5	S2?	Nature Serve (2015): Found in near water, often in canyons or broken tropical forests of coastal plains, mesquite grassland, pine forest, or oak scrub.	Nature Serve (2015): Northern Colombia, South American up through Central America, Texas, New Mexico, and central Arizona. Schmidly and Bradley (2016)[73]: Southern Texas, infrequently reported, mostly near the Rio Grande.	Cuarón et al (2016)[74]: Numbers unknown but population estimates range from rare to common. Rare in the U.S.
144.	*Pseudotryonia adamantina*	Diamond tryonia	Mollusks	Freshwater Aquatic	No	E	Designated- Pecos County, Texas	-	G1	S1	Nature Serve (2015): Occurs on mud substrates on margins of seeps, marshes, and small springs with flowing water and associated with cattails and sedge wetlands, but not marshy pools.	Nature Serve (2015): Endemic to a 1.24-mile section of the Diamond Y spring system and associated outflows of the Pecos River Valley near Fort Stockton in Pecos County, Texas.	Nature Serve (2015): Approximately 250 to 10,000 individuals.
145.	*Fusconaia (syn. Quincuncina) mitchelli*	False spike	Mollusks	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	T	GH	SH	Howell (2014)[75]: Found in slow to medium flowing creeks and rivers with sand, gravel or cobble substrates; not found in deep waters or impoundments.	Howell (2014): Endemic to the Guadalupe-San Antonio, Colorado, and Brazos Rivers in Central Texas.	Howell (2014): Living specimens found in 2013, but abundance numbers are not given.
146.	*Radiocentrum ferrissi*	Fringed mountainsnail	Mollusks	Terrestrial[76]	No	Petitioned for Listing: 90 Day Not Substantial	No	-	G1	S1	Nature Serve (2015): Species is terrestrial, no other information provided.	Nature Serve (2015): Texas and New Mexico, known from Texas only from fossil record (Franklin Mountains, El Paso County).	Insufficient Information found.
147.	*Quadrula aurea*	Golden orb	Mollusks	Freshwater Aquatic	No	Candidate	No	T	G1	S2	Nature Serve (2015): Found in flowing freshwater streams with sand/gravel substrate. Howell (2014): Occurs in rivers and modified creeks, but is not impoundments. except in Lake Corpus Christi (Nueces River Drainage) where it inhabits wind-swept points where conditions may simulate flowing water environments. It usually occurs in firm mud, sand, and gravel at depths to at least 3 m.	Nature Serve (2015): Upper and Lower Guadalupe, Nueces, and San Marcos Rivers in Texas. Howell (2014): Endemic only to the Guadalupe-San Antonio basins of Central Texas. Reports from other systems represent misidentifications of other quadrulids.	Nature Serve (2015): Approximately 2,500 to 100,000 individuals. Howell (2014): New populations have been discovered in the Guadalupe-San Antonio drainage in recent years.
148.	*Tryonia circumstriata*	Gonzales tryonia	Mollusks	Freshwater Aquatic	No	E	Designated- Pecos County, Texas	-	G1	S1	Nature Serve (2015): Occurs on mud substrates on margins of seeps, marshes, and small springs with fresh water and associated with cattails and sedges.	Nature Serve (2015): Occurs in Pecos County, Texas in the Diamond Y springs system and associated outflows.	Nature Serve (2015): Approximately 50 to 2,500 individuals.
149.	*Pleurobema riddellii*	Louisiana pigtoe	Mollusks	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	T	G1G2	S1	Howell (2014): Found in creeks and rivers in bottoms of clay, mud, sand, and gravel, sometimes mixed with silt or detritus, often in shallow to moderate depths with slow to swift flows. Does not prefer lakes or reservoirs.	Howell (2014): San Jacinto River to the Sulphur River in Texas. Long believed extirpated from the upper Trinity River (type locality), but recent studies have found survivors persisting there.	Howell (2014): Very rare in Texas in recent decades; however, recent surveys have found it surviving at more sites than recognized earlier.

[72] Wilson, D. E. and D.M. Reeder eds. 2005. Mammal species of the world: a taxonomic and geographic reference (Vol. 1). JHU Press. Available at https://books.google.com/books?hl=en&lr=&id=JgAMbNSt8ikC&oi=fnd&pg=PR19&ots=Qdg01PnY5a&sig=Nrrwu8XPsbxY300P8uSVr2Ajtic#v=onepage&q&f=false. Accessed January 30, 2017.
[73] Schmidly, D.J., and R.D. Bradley. 2016. The Mammals of Texas, Seventh Edition. University of Texas Press, Austin. 720 pp. Print.
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[76] Metcalf, A., and R.A. Smartt (eds). 1997. Land Snails of New Mexico: Bulletin 10. New Mexico Museum of Natural History and Science. 47 pp.

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
150.	*Truncilla cognata*	Mexican fawnsfoot	Mollusks	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	T	G1Q	S1	Howell (2014): Found in flowing waters of the Rio Grande in substrates of sand, mud, and gravel; not found in reservoirs.	Howell (2014): Endemic to the Rio Grande drainage in Texas and Mexico.	Nature Serve (2015): Approximately 1 to 250 individuals.
151.	*Phreatodrobia imitata*	Mimic cavesnail	Mollusks	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	-	G1	S1	Nature Serve (2015): Found in freshwater subterranean habitat.	Nature Serve (2015): 2 wells on the Edwards Aquifer.	Insufficient Information found.
152.	*Arkansia wheeleri*	Ouachita rock pocketbook	Mollusks	Freshwater Aquatic	No	E	No	-	G1	SH	Howell (2014): Found in moderate-size, slow-flowing rivers and occasionally in side channels or backwaters on gravel and cobble, or occasionally in sand, frequently in deeper pools.	Nature Serve (2015): Currently known from Red River and Ouachita River systems. Single shells were recovered from Pine and Sanders Creek in Texas. Howell (2014): Two shells were recovered from the Red River in Lamar county.	Nature Serve (2015): Approximately 1,000 to 2,500 individuals.
153.	*Assiminea pecos*	Pecos assiminea snail	Mollusks	Aquatic / Terrestrial[77]	No	E	Designated-Pecos and Reeves Counties, Texas	E	G1	S1	Nature Serve (2015): Semi-aquatic; found in herbaceous wetlands and along spring edges with vegetation primarily of American three-square (*Scirpus americanus*), common reed (*Phragmites australis*) and spike rush (*Eleocharis spp.*).	Nature Serve (2015): In the Diamond Y spring system in Texas; in a spring in the Roswell area of the Pecos River Valley in New Mexico.	Nature Serve (2015): Approximately 1000 to 10,000 individuals.
154.	*Pyrgulopsis texana*	Phantom Cave springsnail	Mollusks	Freshwater Aquatic	No	E	Designated-Reeves and Jeff Davis Counties, Texas	-	G1	S1	Nature Serve (2015): Found in artesian springs, specifically where streams issues from caves and about 100 feet downstream.	Nature Serve (2015): Found in three springs in the vicinity of Balmorhea, Reeves County, Texas and in a small area of Phantom Lake Spring, Phantom Cave, Texas.	Nature Serve (2015): Estimated at over 1,000,000 individuals.
155.	*Tryonia cheatumi*	Phantom tryonia	Mollusks	Freshwater Aquatic	No	E	Designated-Reeves and Jeff Davis Counties, Texas	-	G1	S1	Nature Serve (2015): Currently only found in modified waters on the margins of spring flows, with preference to firm substrate and in soft mud downstream from the source before modification.	Nature Serve (2015): Found in the drainage of Toyah Creek and the Pecos River basin in Jeff Davis and Reeves Counties, Texas in three springs systems: San Solomon Spring, Phantom Lake, and East Sandia Spring.	Nature Serve (2015): Approximately 2,500 to 1,000,000 individuals.
156.	*Potamilus metnecktayi*	Salina mucket	Mollusks	Freshwater Aquatic	No	Petitioned for Listing: Findings Not Yet Made	No	T	G1	S1	Nature Serve (2015): Found in freshwater, flowing streams and rivers with sand and gravel substrate. Howell (2014): Found in the main stem of the Rio Grande and historically in some Mexican tributaries in flowing waters with mud and gravel habitats or occasionally in softer substrates; typically recorded in waters less than 1.5 m deep. Not known from reservoirs.	Nature Serve (2015): Rio Grande in Texas, south down to Mexico. Howell (2014): Endemic to Rio Grande drainage only. Currently only known to persist between Big Bend and the mouth of the Pecos River.	Nature Serve (2015): Approximately 1,000 to ,2500 individuals.
157.	*Lampsilis satura*	Sandbank pocketbook	Mollusks	Freshwater Aquatic	No	-	No	T	G2	S1	Howell (2014): Not confirmed in reservoirs, but found in larger creeks and rivers with slow to moderate flows and substrates of stable sand, firm mud, and gravel.	Nature Serve (2015): Known from western Gulf drainages of Louisiana, Arkansas, Mississippi, and Texas as well as southern portions of the Mississippi Interior basin, and possibly reported in Oklahoma. Howell (2014): Found in San Jacinto River to Big Cypress Bayou, and possibly in the Red and Sulphur rivers, though not confirmed from either Jacinto or Trinity in recent years.	Nature Serve (2015): Approximately 100,000 to >1,000,000 individuals.

[77] Johnson, P.D., A.E. Bogan, K.M. Brown, N.M. Burkhead, J.R. Cordeiro, J.T. Garner, P.D. Hartfield, D.A.W. Lepitzki, G.L. Mackie, E. Pip, T.A. Tarpley, J.S. Tiemann, N.V. Whelan, and E.E. Strong. 2013. Conservation Status of Freshwater Gastropods of Canada and the United States. *Fisheries* 38(6): 247-282. Aquatic/Terrestrial

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
158.	*Quadrula houstonensis*	Smooth pimpleback	Mollusks	Freshwater Aquatic	No	Candidate	No	T	G2	S1S2	Howell (2014): Found in moderate-size creeks, rivers, and some reservoirs in substrates of mud, sand, and gravel.	Howell (2014): Endemic to Colorado and Brazos drainage basins. Reports from other waters are based on misidentification.	Nature Serve (2015): Approximately 2,500 to 10,000 individuals. Howell (2014): Although several newly recognized populations have been discovered in recent years. This species had declined in abundance.
159.	*Obovaria jacksoniana*	Southern hickorynut	Mollusks	Freshwater Aquatic	No	-	No	T	G2	S1	Nature Serve (2015): Observed in small to large rivers with medium sized gravel and low to moderate current.	Nature Serve (2015): Historically found from Alabama to eastern Texas, and in the Mississippi embayment as far north as southeastern Missouri. Reported in the Mississippi River, Yazoo and Big Black River drainages in Mississippi. Howell (2014): Texas populations found in the Neches-Angelina, Sabine, and Big Cypress systems.	Howell (2014): Very rare, found at only two locations in several decades.
160.	*Lampsilis bracteata*	Texas fatmucket	Mollusks	Freshwater Aquatic	No	Candidate	No	T	G1	S1	Howell (2014): Found in flowing creeks and smaller rivers with firm mud, stable sand, and gravel bottoms, in shallower waters. Some populations inhabit cracks in rock layers or among bald cypress roots. Established populations are not known from impoundments but specimens deposited in the upper reaches of reservoirs may endure for limited periods of time.	Howell (2014): Endemic to the upper Guadalupe-San Antonio and Colorado drainages of the Texas Hill Country and Edwards Plateau. It does not occur in the lower river reaches on the coastal plain.	Nature Serve (2015): Approximately 1 to 250 individuals. Howell (2014): Since the 1970s, this species has been reduced to a limited number of small populations at scattered, isolated locations.
161.	*Truncilla macrodon*	Texas fawnsfoot	Mollusks	Freshwater Aquatic	No	Candidate	No	T	G2Q	S1	Nature Serve (2015): Found in larger streams and rivers with moderate flow with a sand/ gravel, or sand/mud substrate.	USFWS (2016)[78]: Lower Colorado, San Saba, and Brazos Rivers in Texas.	Howell (2014): Quite rare historically and its conservation status is far from secure.
162.	*Potamilus amphichaenus*	Texas heelsplitter	Mollusks	Freshwater Aquatic	No	Petitioned for Listing: Findings Not Yet Made	No	T	G1G2	S1	Howell (2014): Found in moderately flowing rivers and larger creeks with mud, sand, or fine gravel environments; adapts well to some reservoirs.	Howell (2014): Endemic to the Neches-Angelina, Sabine, and possibly Trinity rivers in Texas.	Nature Serve (2015): Approximately 2,500 to 100,000 individuals.
163.	*Popenaias popeii*	Texas hornshell	Mollusks	Freshwater Aquatic	No	E	No	T	G1	S1	Nature Serve (2015): Found at the start and end of narrow, freshwater streams with small-grained substrate. Howell (2014): Not known from reservoirs, often in moderate-size creeks and rivers with slow to moderate flows, and clay or mixed substrate types, avoiding shifting sand or deep silt. Often near banks, boulders or in crevices as well as pools, runs, and terraces.	Nature Serve (2015): Lower Pecos River in New Mexico and Lower Rio Grande River in Brownsville, Texas; south to Potosi, Mexico. Occurs in Brewster, Terrell, Val Verde, Webb, and Zapata counties, Texas.	Nature Serve (2015): Approximately 1,000 to 2,500 individuals.
164.	*Fusconaia askewi*	Texas pigtoe	Mollusks	Freshwater Aquatic	No	-	No	T	G2G3	S2S3	Howell (2014): Not typical of reservoirs, found in mid-size creeks and rivers with slow to moderate flows and mud, gravel, sand, or mixed substrates.	Nature Serve (2015): Texas records from Neches and Sabine rivers, also from San Jacinto Rivers, additionally found in western gulf drainages of Louisiana. Howell (2014): Possibly in Sulphur and Red Rivers.	Howell (2014): More numerous than previously thought.
165.	*Quadrula petrina*	Texas pimpleback	Mollusks	Freshwater Aquatic	No	Candidate	No	T	G2	S1	Howell (2014): Found in moderate to large creeks and rivers in flowing waters and mud, sand, or gravel bottoms, or sometimes in gravel-filled cracks in bedrock, often at depths less than 2 m. Not known from impoundments.	Howell (2014): Endemic to the Colorado and Guadalupe-San Antonio systems of Central Texas.	Howell (2014): Dramatically reduced in abundance and distribution in recent years, but found surviving at a number of new locations since 2006.

[78] USFWS. 2016. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notification of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions. *Federal Register* 81(322): 87246-87272.

Red text denotes inclusion as a Covered Species.

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166.	*Fusconaia lananensis*	Triangle pigtoe	Mollusks	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	T	G1Q	S1	Howell (2014): Found in moderate-size creeks and rivers in mud, sand, and fine gravel with slow to moderate flows in the eastern Texas Pineywoods. Not known from reservoirs.	Howell (2014): Endemic to the Angelina River and Attoyac Bayou of the upper Neches-Angelina system and Village Creek in the lower drainage basin.	Howell (2014): Limited distribution, quite rare, often confused with Texas Pigtoe
167.	*Thymophylla tephroleuca*	Ashy dogweed	Plants	Terrestrial	No	E	No	E	G2	S2	Nature Serve (2015): Found in fine sand or sandy-loam soils in forested woodlands, grasslands, or shrubland chaparral.	Nature Serve (2015): South Texas in Starr and Zapata Counties.	USFWS (2011)[79]: Reported population size exceeds several hundreds of thousands of individuals, with a potential population size exceeding one million individuals in just one of the metapopulations.
168.	*Salvia pentstemonoides*	Big red sage	Plants	Terrestrial	No	Petitioned for Listing: 90 Day Substantial	No	-	G1	S1	Nature Serve (2015): Found in clay or silt soils along creekbeds or steep slopes in drainages of oak or maple-oak woodlands.	Nature Serve (2015): Endemic to the Edwards Plateau in Texas.	Nature Serve (2015): Estimated at less than a few hundred individuals.
169.	*Echinocereus reichenbachii var albertii*	Black lace cactus	Plants	Terrestrial	No	E	No	E	G5T1Q	S1	Nature Serve (2015): Found in sandy soils in grasslands, thorn shrublands, and mesquite-acacia woodlands. USFWS (2009) [80]: Found near watercourses in moderately saline soils.	Nature Serve (2015): Endemic to South Texas coastal bend area. Only in Texas in Jim Wells, Kleberg, Nueces, and Refugio Counties. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Also found in McMullen and Atascoca Counties, Texas.	Nature Serve (2015): Population size difficult to measure because sampling method not systematic. USFWS (2009): Reported population sizes have exceeded 1,000 during most surveys.
170.	*Streptanthus bracteatus*	Bracted twistflower	Plants	Terrestrial	No	Candidate	No	-	G1G2	S1S2	Nature Serve (2015): Found on slopes in oak-juniper woodlands with well-drained soils.	Nature Serve (2015): Only found in a small area of the Edwards Plateau in Texas.	Holder (2014)[81]: 11 populations or population fragments. USFWS (2016)[82]: Potential maximum population is approximately 7,500 individuals.
171.	*Genistidium dumosum*	Brush-pea	Plants	Terrestrial	No	Petitioned for Listing: 90 Day Substantial	No	-	G1	S1	Nature Serve (2015): Found on low elevation, limestone hills with Chihuahuan Desert scrub vegetation.	Nature Serve (2015): Between Terlingua and Lajitas, Brewster County, Texas (3 populations); 1 population in Coahuila, Mexico.	Nature Serve (2015): Texas populations has less than 50 plants, very rare across range.
172.	*Coryphantha ramillosa*	Bunched Cory cactus	Plants	Terrestrial	No	T	No	T	G2G3T2T3	S2S3	Nature Serve (2015): Found on rocky slopes, ledges, and gravelly flats on Boquillas or Santa Elena limestones in succulent scrub of the Chihuahuan Desert.	Nature Serve (2015): Occupies substantial portion of northern part of Coahuila, Mexico extending into near the Rio Grande in Texas.	Nature Serve (2015): Estimated 5,000 to 10,000 plants in Brewster and Terrell Counties, Texas.
173.	*Paronychia congesta*	Bushy whitlowwort	Plants	Terrestrial	No	Petitioned for Listing: 90 Day Substantial	No	-	G1	S1	Nature Serve (2015): Found in shrubland/ chaparral on rocky slopes and ridges of the Bordas Escarpment.	Nature Serve (2015): Occurs in south Texas. Poole et al. (2007)[83]: Jim Hogg County, Texas.	Nature Serve (2015): Two populations: 2,000 individuals at one site and 100 at the other.
174.	*Pediomelum pentaphyllum*	Chihuahua scurfpea	Plants	Terrestrial	No	Petitioned for Listing: 90 Day Substantial	No	-	G1G2	SH	Nature Serve (2015): Found in bare areas in desert, grassland /herbaceous, shrubland/chaparral with; sandy, loamy soil.	Nature Serve (2015): New Mexico, Arizona, west Texas, and Chihuahua, Mexico. Poole et al. (2007): Presidio County, Texas.	Nature Serve (2015): 120 plants in New Mexico; 700 plants in Arizona. Poole et al. (2007): Known in Texas from one plant collected around 1853.
175.	*Hexalectris revoluta*	Chisos coralroot	Plants	Terrestrial	No	Petitioned for Listing: 90 Day Substantial	No	-	G2	SNR	Nature Serve (2015): Found under heavy leaf litter in oak-pine-juniper forests on hillsides.	Poole et al (2007): Mountains of Brewster and Culberson Counties, Texas; also mountains in U.S. in Arizona, New Mexico, and Mexico in Nuevo Leon and San Luis Potosi.	Nature Serve (2015): Approximately 250 individuals.

[79] U.S. Fish and Wildlife Service (USFWS). 2011. Ashy Dogweed (*Thymophylla* [=*Dyssodia*] *tephroleuca*)—5-year Status Review: Summary and Evaluation. USFWS Corpus Christi Field Office. Corpus Christi, Texas. 37 pp.
[80] U.S. Fish and Wildlife Service (USFWS). 2009. Black Lace Cactus (*Echinocereus reichenbachii* var. *albertii*)—5-year Review: Summary and Evaluation. USFWS Corpus Christi Ecological Services Field Office. Corpus Christi, Texas. 32 pp.
[81] Holder, M.R. 2014. A petition to list the bracted twistflower, *Streptanthus bracteatus* a. gray, as endangered or threatened and request for emergency listing under the endangered species act. Notice of petition. 48 pp.
[82] U.S. Fish and Wildlife Service (USFWS). 2016. Species Assessment and Listing Priority Assessment Form: Bracted Twistflower (*Streptanthus bracteatus*). USFWS Southwest Region. Albuquerque, New Mexico. 29 pp.
[83] Poole, J.M, W.R. Carr, D.M. Price, and J.R. Singhurst. 2007. Rare plants of Texas. Texas A&M University Press. Print.

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176.	*Echinocereus chisoensis var chisoensis*	Chisos Mountains hedgehog cactus	Plants	Terrestrial	No	T	No	T	G2T1	S1	Nature Serve (2015): Found at moderate elevations on unconsolidated gravelly fan and terrace deposits of grasslands or open xeromorphic shrublands of the Chihuahuan Desert.	Nature Serve (2015): Only in Big Bend National Park, Texas.	Terry et al (2013)[84]: Estimated at 1,000 individuals, decreasing though.
177.	*Physostegia correllii*	Correll's false dragon-head	Plants	Freshwater Aquatic	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G2	S2	Nature Serve (2015): Occupies wetlands, roadside and irrigation ditches.	Nature Serve (2015): Texas, southern Louisiana, and northern Mexico.	Nature Serve (2015): Less than 15 occurrences.
178.	*Cyperus cephalanthus*	Cryptic flatsedge	Plants	Terrestrial	No	Petitioned for Listing: 90 Day Not Substantial	No	-	G3?Q	S1	Nature Serve (2015): Occurs in coastal prairies.	Nature Serve (2015): West Gulf Coastal Plain in southwestern Louisiana and southeastern Texas; and in South America.	Nature Serve (2015): Approximately 2000 plants in Louisiana; 50 plants in Texas; South. America population unknown.
179.	*Echinocereus davisii*	Davis' green pitaya	Plants	Terrestrial	No	E	No	E	G5T1	S1	Nature Serve (2015): Grows on spikemoss (*Selaginella sp.*)-covered patches of novaculite (quartz-like) outcrops in full sun, among sparse Chihuahuan desert scrub.	Nature Serve (2015): Only found in Texas in Brewster County.	USFWS (2012)[85]: Population of more than 500,000 throughout the Caballos formation.
180.	*Donrichardsia macroneuron*	Don Richard's spring moss	Plants	A/T[86]	No	Petitioned for Listing: 90 Day Substantial	No	-	G1	S1	Nature Serve (2015): Grows on boulders in limestone springs.	Nature Serve (2015): Springs on South Llano River in Edwards County, Texas.	Nature Serve (2015): Known from one occurrence.
181.	*Geocarpon minimum*	Earth fruit (Tinytim)	Plants	Terrestrial	No	T	No	T	G2	S1	Nature Serve (2015): Found in saline prairies and sandstone glades. TPWD (2017): Found in vegetated edges of slick spots in saline barren complex with claypan soils, just above floodplain of Neches River, mostly found on the cryptogamic lip along slick spot perimeter.	Nature Serve (2015): Anderson County, Texas; also Louisiana; Arkansas; and Missouri. Historically more widespread in Missouri.	USFWS (2016)[87]: 37 populations, mostly on public or protected land, with 4 in Texas. Species is close to delisting.
182.	*Festuca ligulata*	Guadalupe fescue	Plants	Terrestrial	No	E	Designated-Brewster County, Texas	-	G1	S1	Nature Serve (2015): Occupies pine-oak-juniper woodlands on slopes greater than 1,830 feet above mean sea level.	Nature Serve (2015): Trans-Pecos, Texas and Coahuila, Mexico.	Nature Serve (2015): 150 individuals in Big Bend National Park in Texas; unknown number on private land in Coahuila, Mexico.
183.	*Schoenoplectus hallii*	Hall's bulrush	Plants	A/T	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G2G3	S1	Nature Serve (2015): Terrestrial (cropland and grassland) to emergent (herbaceous wetlands).	Nature Serve (2015): Texas, Illinois, Indiana, Kansas, Kentucky, Missouri, Oklahoma, and Nebraska. In Wise County, Texas.	Nature Serve (2015): Estimated at thousands of individuals.
184.	*Fissidens hallii*	Hall's pocket moss	Plants	Freshwater Aquatic	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G2	SNR	Nature Serve (2015): Found in forested wetlands; especially cypress (*Taxodium sp.*) swamps.	Nature Serve (2015): Texas, Florida, Louisiana, and South Carolina.	Center for Biological Diversity (2010)[88]: Significantly rare, estimated fewer than 100 populations, but unknown.
185.	*Quercus hinckleyi*	Hinckley's oak	Plants	Terrestrial	No	T	No	T	G2	S1	Nature Serve (2015): Found at mid-elevations of arid, rocky, limestone-derived soils or limestone outcrops of Chihuahuan Desert shrublands.	Nature Serve (2015): At least one record in Mexico, otherwise known from the Chihuahuan desert of Brewster and Presidio Counties, Texas.	Nature Serve (2015): Majority of populations contain less than 100 trees.
186.	*Frankenia johnstonii*	Johnston's frankenia	Plants	Terrestrial	No	Delisted	No	E	G3	S3	Nature Serve (2015): Found in open thorn shrublands on rocky areas where soils are saline, sometimes with high concentrations of gypsum.	Nature Serve (2015): Zapata and Starr Counties., southwest Texas and near Monterrey in Nuevo Leon, Mexico.	Nature Serve (2015): Approximately 1,000 plants in Texas; several hundred in Mexico.
187.	*Abronia macrocarpa*	Large-fruited sand-verbena	Plants	Terrestrial	No	E	No	E	G2	S2	Nature Serve (2015): Found in deep, well-drained sands, within a post oak (*Quercus stellata)*-grassland.	Nature Serve (2015): Only in Freestone, Leon, and Robertson Counties in Texas.	Nature Serve (2015): Several thousand estimated.

[84] Terry, M., Heil, K., and Corral-Díaz, R. 2013. *Echinocereus chisoensis*. The IUCN Red List of Threatened Species 2013: e.T152215A610853. Available at http://dx.doi.org/10.2305/IUCN.UK.2013-1.RLTS.T152215A610853.en. Downloaded on 01 February 2017
[85] USFWS. 2012. 5 year review of Davis's Green Pitaya *Echinocereus viridiflorus* var. *davisii* Houghton and Nellie's Cory Cactus *Escobaria minima* (Baird) D.R. Hunt (Syn. *Coryphantha minima* Baird). Austin, Texas. 37 pp.
[86] Bryophyte Specialist Group. 2000. *Donrichardsia macroneuron*. The IUCN Red List of Threatened Species 2000: e.T39166A10166698. Available at http://dx.doi.org/10.2305/IUCN.UK.2000.RLTS.T39166A10166698.en. Downloaded on 02 February 2017.
[87] USFWS. 2016. 5 Year Review of Geocarpon minimum. Conway, Arkansas. 42 pp.
[88] Center for Biological Diversity. 2010. Petition to list 404 aquatic, riparian and wetland species from the southeastern United States as threatened or endangered under the Endangered Species Act. 1145 pp.

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188.	*Agalinis calycina*	Leoncita false-foxglove	Plants	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	-	G1	S1	Nature Serve (2015): Occurs in herbaceous freshwater wetlands.	Nature Serve (2015): Western Texas, New Mexico, and Coahuila, Mexico.	Sivinksi (2011)[89]: Two extant populations in the U.S., in protected areas.
189.	*Potamogeton clystocarpus*	Little Aguja pondweed	Plants	Freshwater Aquatic	No	E	No	E	G1	S1	TPWD (2017): Found in intermittent, spring-fed stream with rocky substrate in a mountain canyon.	TPWD (2017): Only found on private property in one place in Jeff Davis County, Texas.	USFWS (1994)[90]: No populations observed after 1992.
190.	*Sclerocactus mariposensis*	Lloyd's mariposa cactus	Plants	Terrestrial	No	T	No	T	G2	S2	Nature Serve (2015): Found in at low to mid-elevations in sotol-lechuguilla primarily on the Boquillas formation in arid, limestone-derived, gravelly soils on gentle slopes. USFWS (2018)[91]: Occurs in sparsely vegetated, highly fractured limestones of Chisos, Santa Elena, Sue Peaks, Del Carmen, Telephone Canyon, Boquillas, Glen Rose, Del Rio Clay, Aguja, and Pen formations. Elevation range 2,460 to 3,770 feet; highest probability on Mariscal-Rock Outcrop Complex.	Nature Serve (2015): Occurs in Central Coahuila, Mexico and the Chihuahuan Desert in Texas. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Occurs in Central Coahuila, Mexico and in Presidio, Brewster, and Terrell Counties in the Chihuahuan Desert in Texas	Heil & Terry (2013)[92]: Abundant throughout range.
191.	*Agalinis navasotensis*	Navasota false foxglove	Plants	Terrestrial	No	Petitioned for Listing: 90 Day Substantial	No	-	G1	S1	Nature Serve (2015): Occupies grassland/ herbaceous savannahs. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Closely associated with little bluestem (*Schizachyrium scoparium*) and possibly other native grasses.	Nature Serve (2015): Sandstone outcrop in Grimes County in east Texas. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Known from two other populations occurring on sandy soils in Grimes and Tyler Counties in Texas.	Nature Serve (2015): Only one occurrence of less than 500 individuals.
192.	*Spiranthes parksii*	Navasota ladies' tresses	Plants	Terrestrial	No	E, Petitioned for Delisting: 90 Day Not Substantial	No	E	G3	S3	Nature Serve (2015): Found along the Navasota River and intermittent tributaries of rivers, in openings in post oak (*Quercus stellata*) woodlands in sandy loam soil. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Found along the outer margins of first-order (HUC-12) watercourses, in openings in post oak (*Quercus stellata*) woodlands in sandy loam soil.	Nature Serve (2015): Eastern Texas along the Navasota River, in Bastrop, Brazos, Burleson, Fayette, Freestone, Grimes, Jasper, Leon, Limestone, Madison, Milam, Robertson, and Washington Counties.	Nature Serve (2015): Approximately 2,000 individuals.
193.	*Hibiscus dasycalyx*	Neches River rose-mallow	Plants	Terrestrial	No	T	Designated-Nacogdoches, Houston, Trinity, Cherokee, and Harrison Counties, Texas	-	G1	S1	Nature Serve (2015): Found along margins of riparian woodlands in seasonally wet soils and in openings of shrub swamps, often near standing water.	Nature Serve (2015): Only in east Texas in Cherokee, Harrison, Houston, and Trinity Counties.	Nature Serve (2015): Most recent estimates account for 2,200 plants, with an additional 210 plants at introduced sites.
194.	*Escobaria (syn. Coryphantha) minima*	Nellie Cory cactus	Plants	Terrestrial	No	E	No	E	G1	S1	Nature Serve (2015): Found in rock crevices on novaculite (quartz-like) outcrops in Chihuahuan desert scrub.	Nature Serve (2015): Only found in Texas in Brewster County.	USFWS (2012): Population of more than 1,000,000 throughout the Caballos formation.
195.	*Helianthus paradoxus*	Pecos/Puzzle sunflower	Plants	Terrestrial	No	T	Designated-Pecos County, Texas	T	G2	S1	Nature Serve (2015): Found in permanently saturated saline soils.	Nature Serve (2015): In four areas of New Mexico and two areas in Pecos and Reeves Counties, Texas.	Nature Serve (2015): Possibly 3,000 individuals, locally abundant, though some small nonviable populations exist in New Mexico.
196.	*Asclepias prostrata*	Prostrate milkweed	Plants	Terrestrial	No	Petitioned for Listing: 90 Day Substantial	No	-	G1G2	S1S2	Nature Serve (2015): Found in fine, sandy loam soils in grasslands and shrublands	Nature Serve (2015*)*: Starr and Zapata Counties in Texas and Tamaulipas, Mexico.	Insufficient Information found.
197.	*Symphyotrichum puniceum var. scabricaule*	Rough-stemmed aster	Plants	Freshwater Aquatic	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G5T2	S2	Nature Serve (2015): Found in bog and pond habitats.	Nature Serve (2015): Central, eastern Texas; Louisiana; Mississippi.	Strong and Williams (2015)[93]: Known from 31 extant sites; population sizes are unreported

[89] Sivinski, R.C. 2011. *Agalinis calycina* (Leoncita false-foxglove): A conservation status assessment. 2011 ESA Section 6 Progress Report. Santa Fe, New Mexico. 17 pp.
[90] USFWS. 1994. Little Aguja Pondweed recovery plan. Albuquerque, New Mexico. 85 pp.
[91] USFWS. 2018. Lloyd's mariposa cactus (*Sclerocactus mariposensis* (Hester) N.P Taylor) five-year review: Summary and evaluation. Austin Ecological Services Field Office, Austin, Texas. 41 pp.
[92] Heil, K. & Terry, M. 2013. *Sclerocactus mariposensis*. The IUCN Red List of Threatened Species 2013: e.T152052A591676. Available at http://dx.doi.org/10.2305/IUCN.UK.2013-1.RLTS.T152052A591676.en. Downloaded on 01 February 2017.
[93] Strong, A., and P. Williams. 2015. Data synthesis and species assessments to aid in determining future candidate or listed status for plants from the USFWS lawsuit settlements—Final performance report as required by the Endangered Species Program, Texas, Grant No. TX E-146-R (F12AP00864). Texas Parks and Wildlife Department. Austin, Texas. 198 pp.

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Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
198.	*Helianthus occidentalis* ssp. *plantagineus*	Shinner's sunflower	Plants	Terrestrial	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G5T2T3	S2S3	Nature Serve (2015): Found in sand on top of clay on savannahs.	Nature Serve (2015): Arkansas, Texas, and Louisiana.	Center for Biological Diversity (2010): Between 10 and 15 populations in Texas and 5 in Arkansas.
199.	*Hoffmannseggia tenella*	Slender rushpea	Plants	Terrestrial	No	E	No	E	G1	S1	Nature Serve (2015): Occurs in sparsely vegetated openings within grasslands with clay soils; occasionally found on creek banks. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Occurs in coastal shortgrass prairies dominated by buffalo grass and other native grasses, on vertisol soils and sandy-clay soils.	Nature Serve (2015): Only in Nueces County, Texas. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Only found in Nueces and Kleberg Counties in Texas.	Nature Serve (2015): Over 10,000 individuals.
200.	*Eriocaulon koernickianum*	Small-headed pipewort	Plants	Freshwater Aquatic	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G2	S1	Nature Serve (2015): Found in seepages and wet depressions; specifically in Texas in sandy, acidic seepages.	Nature Serve (2015): Arkansas, Oklahoma, Texas, and Georgia.	Nature Serve (2015): Hundreds or thousands of individual plants per location.
201.	*Ambrosia cheiranthifolia*	South Texas ambrosia	Plants	Terrestrial	No	E	No	E	G2	S2	Nature Serve (2015): Found in grasslands and mesquite-dominated shrublands. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Occurs in coastal shortgrass prairies dominated by buffalograss and other native grasses, on vertisol soils and sandy-clay soils.	Nature Serve (2015): Coastal south Texas, south to Tamaulipas, Mexico. Found in Cameron, Kleberg, and Nueces Counties, Texas.	Nature Serve (2015): Individuals difficult to count because of extensive spreading rhizomes. Infrequent or rare. Hempel (2009)[94]: several thousands of stems estimated across at least 6 extant sites
202.	*Astrophytum asterias*	Star cactus	Plants	Terrestrial	No	E	No	E	G1G2	S1S2	TPWD (2017): Grows in sparse openings between shrub thickets in mesquite grasslands or thorny shrublands. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Most often found in sparsely vegetated, gravelly, marginally saline and/or gypseous clay soils formed over sandstone of Jackson, Yeguas, and Laredo geological formations; some sites are in the Goliad formation caliche.	Nature Serve (2015): Starr County in south Texas, and Tamaulipas, Mexico. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: May also occur in Zapata County Texas. Reports from Hidalgo and Cameron Counties Texas are inaccurate.	Janssen et al. (2010)[95]: Approximately 5,124 individuals were recorded across 25 properties in Texas.
203.	*Cryptantha crassipes*	Terlingua Creek cat's-eye	Plants	Terrestrial	No	E	No	E	G1	S1	Nature Serve (2015): Found in barren/sparse vegetation on low xeric hills with high levels of clay and gypsum.	Nature Serve (2015): Endemic to Texas; only found in Brewster County.	USFWS (1994)[96]: Known from 10 sites with approximately 4,500 plants.
204.	*Ayenia limitaris*	Texas ayenia	Plants	Terrestrial	No	E	No	E	G2	S1	TPWD (2017): Found on terraces and floodplains in subtropical, riparian woodlands with dense vegetation and a canopy cover of approximately with 95%. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Found on partial shade (edges and openings) of shrublands and savannas on a wide range of alluvial soils.	Nature Serve (2015): Cameron County, Texas, and Coahuila and Tamaulipas, Mexico. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Found Cameron, Willacy, and Hidalgo Counties in Texas, and Coahuila and Tamaulipas, Mexico. May extend into Kenedy County in Texas.	USFWS (2016)[97]: total population estimated at more than 4,000 individuals, with more than 1,000 individuals in Texas.
205.	*Leavenworthia texana*	Texas golden gladecress	Plants	Terrestrial	No	E	Designated-Sabine and San Augustine Counties, Texas	-	G1	S1	Nature Serve (2015): Occurs on the Weches formation in herbaceous communities of wet glades with shallow calcareous soils.	Nature Serve (2015): On the Weches formation in San Augustine and Sabine Counties, Texas.	USFWS (2013)[98]: population at four monitored sites exceeded 1,000 individuals in 2005, 2007, and 2009.

[94] Hempel, A. 2009. Reproductive biology, genetics and ecology of South Texas ambrosia: implications for the management, recovery and reintroduction—Interim Report as required by the Endangered Species Program, Texas, Grant No. TX E-110-R. Texas Parks and Wildlife Department. Austin, Texas. 14 pp.
[95] Janssen, G.K., J.M. Poole, and P.S. Williamson. 2010. Final Report as required by the Endangered Species Program, Texas, Grant No. TX E-46-R: The research and recovery of star cactus (*Astrophytum asterias*). Texas Parks and Wildlife Department. Austin, Texas. 142 pp.
[96] U.S. Fish and Wildlife Service (USFWS). 1994. Terlingua Creek Cat's-eye recovery plan. Albuquerque, New Mexico. 76 pp.
[97] U.S. Fish and Wildlife Service (USFWS). 2016. Recovery plan for the Tamaulipan kidneypetal (Texas ayenia) (*Ayenia limitaris*). USFWS Southwest Region. Albuquerque, New Mexico. 106 pp.
[98] U.S. Fish and Wildlife Service (USFWS). 2013. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Texas Golden Gladecress and Threatened Status for Neches River Rose-Mallow; Final Rule. 78 Federal Register 56026.

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
206.	*Callirhoe scabriuscula*	Texas poppy-mallow	Plants	Terrestrial	No	E	No	E	G2	S2	Nature Serve (2015): Occurs in grasslands, shin oak (*Quercus havardii*) shrublands, and open oak or mesquite woodlands in deep, loose sand.	Nature Serve (2015): Coke, Mitchell, and Runnels Counties, Texas.	Nature Serve (2015): 10 populations; individual number unknown.
207.	*Hymenoxys texana*	Texas prairie dawn	Plants	Terrestrial	No	E	No	E	G2	S2	Nature Serve (2015): Found in poorly drained, sparsely vegetated or barren areas and in grasslands at the bases of small mounds. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Found in poorly drained, moderately saline clays in sparse grasslands, often in bare spots at the bases of small mounds.	Nature Serve (2015): Only found in Harris County, Texas.	USFWS (2015)[99]: Known populations contain more than an estimated 50,000 individuals
208.	*Bartonia texana*	Texas screwstem	Plants	Freshwater Aquatic	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G2	S2	Nature Serve (2015): Occupies creeks, bogs, forested wetlands, scrub-shrub wetlands.	Nature Serve (2015): East Texas and Louisiana.	Nature Serve (2015): Estimated at less than 1,000 individuals.
209.	*Styrax texanus (Syn. Styrax platanifolius ssp texanus)*	Texas snowbells	Plants	Terrestrial	No	E	No	E	G3T1	S1	TPWD (2017): Grows in the crevices along steep limestone cliffs along streams and in gravel of dry creek beds. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Grows in cliffs, rocky slopes and creek beds and up to 150 meters (500 feet) from first-, second-, and third-order streams.	TPWD (2017): Edwards, Real, and Val Verde Counties, Texas. Poole et al (2007): Also in Kinney County, Texas.	USFWS (2008)[100]: 22 known natural populations with an estimated number of individuals totaling less than 1,000
210.	*Phlox nivalis ssp texensis*	Texas trailing phlox	Plants	Terrestrial	No	E	No	E	G4T2	S2	Nature Serve (2015): Found in fire-maintained openings in deep, sandy soil in upland longleaf pine (*Pinus palustris*) savannahs and post oak-bluejack oak (*Quercus stellata-Q. incana)* woodlands.	Nature Serve (2015): Only known from Hardin, Polk, and Tyler Counties in Texas.	Nature Serve (2015): Less than 750 individuals.
211.	*Trillium texanum*	Texas trillium	Plants	Terrestrial	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G2	S2	Nature Serve (2015): Found in bogs, along springs, and in forest woodlands.	Nature Serve (2015): Texas and Louisiana.	Nature Serve (2015): 3 populations in Louisiana, 8 in Texas.
212.	*Zizania texana*	Texas wild rice	Plants	Freshwater Aquatic	No	E	Designated- Hays County, Texas	E	G1	S1	Nature Serve (2015): Found in clear, flowing, relatively constant temperature spring waters with a sand/silt/clay or gravel substrate.	Nature Serve (2015): Only found in the headwaters of the San Marcos River in Hays County, Texas.	Nature Serve (2015): Less than 500 individuals.
213.	*Amsonia tharpii*	Tharp's blue-star	Plants	Terrestrial	No	Petitioned for Listing: 90 Day Substantial	No	-	G1	S1	Nature Serve (2015): Found in open areas in grassland/herbaceous and shrubland/chaparral; soils are generally shallow and well drained.	Nature Serve (2015): Three populations in New Mexico and one site in Texas Poole et al. (2007): Known from Pecos County, Texas, and Eddy County, New Mexico.	Nature Serve (*2015*): Populations in New Mexico has less than 100 individuals and other two have a few thousand individuals combined.
214.	*Sclerocactus brevihamatus ssp. tobuschii*	Tobusch fishhook cactus	Plants	Terrestrial	No	E, Proposed for Downlisting	No	T	G4T3	S3	USFWS (2010)[101]: Occupies shallow, gravelly soil amongst areas of exposed limestone .	Nature Serve (2015): On the escarpment of the Edwards Plateau in the Central Texas Hill Country. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Found in Kerr, Bandera, Real, Edwards, Uvalde, Kinney, Val Verde, and Kimble Counties in Texas. Recently found in Sutton and Medina Counties in Texas.	USFWS (2010): Documented on 10 protected reserves, largest population has reached 1,100 individuals.

[99] U.S. Fish and Wildlife Service (USFWS). 2015. Texas prairie dawn-flower (*Hymenoxys texana*)—5-year Review: Summary and Evaluation. USFWS Texas Coastal Ecological Services Field Office. Houston, Texas. 34 pp.
[100] U.S. Fish and Wildlife Service (USFWS). 2008. Texas snowbells (*Styrax platanifolius* ssp. *texanus*—5-year Review: Summary and Evaluation. USFWS Austin Ecological Services Field Office. Austin, Texas. 17 pp.
[101] USFWS. 2010. Tobusch Fishhook Cactus 5 Year Review. Austin, Texas. 49 pp.

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215.	*Manihot walkerae*	Walker's manioc	Plants	Terrestrial	No	E	No	E	G2	S1	Nature Serve (2015): Occurs in grassland-thornscrub in sandy-loam soils underlain by caliche. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Closely associated with outcrops of indurated caliche of the Goliad Formation.	Nature Serve (2015): Known from Hidalgo County, Texas, and adjacent areas of Mexico. Christina Williams, USFWS, personal communication to Erik Huebner, LCRA TSC, on November 20, 2018: Known from Hidalgo, Starr, and Duval Counties in Texas, and Tamaulipas, Mexico. Likely to occur in Brooks, Jim Hogg, and Webb Counties in Texas is association with caliche outcrops.	Nature Serve (2015): Probably less than 1,000 individuals.
216.	*Physaria pallida*	White bladderpod	Plants	Terrestrial	No	E	No	E	G1	S1	Nature Serve (2015): Found in open areas associated with exposed calcareous outcrops which are perpetually wet.	Nature Serve (2015): Endemic to San Augustine County, Texas.	Nature Serve (2015): Approximately 3,500 plants.
217.	*Physaria thamnophila*	Zapata bladderpod	Plants	Terrestrial	No	E	Designated- Starr County, Texas	E	G1	S1	Nature Serve (2015): Plants may grow entangled in small shrubs or cacti; found in sandy loam or gravel substrates in open, evergreen thorn shrublands	Nature Serve (2015): Starr and Zapata Counties, Texas.	Nature Serve (2015): Probably fewer than 1,000 individuals.
218.	*Macrochelys temminckii*	Alligator snapping turtle	Reptiles	Freshwater Aquatic	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	T	G3G4	S3	Nature Serve (2015): Found in deep water of freshwater streams and rivers with slow flow rates.	Nature Serve (2015): Southeastern U.S. to Gulf Coast. In Texas, from San Antonio River east.	Nature Serve (2015): Approximately 2,500 - 100,000 individuals.
219.	*Eretmochelys imbricata*	Atlantic hawksbill sea turtle	Reptiles	Marine Aquatic	Yes[102]	E	Designated - Not in TX	E	G3T3Q	S1	TPWD (2017): Found in warmer, clear, waters offshore waters of mainland and island shelves; nest on sandy beaches close to coral reefs and are more common in general near coral reefs.	Nature Serve (2015): Gulf of Mexico and occasionally on Texas coast; also found in warmer waters of the Atlantic, Pacific, Indian Oceans from Japan to Australia and the British Iles to southern Brazil.	Nature Serve (2015): Approximately 10,000 - 100,000 individuals.
220.	*Coniophanes imperialis*	Black-striped snake	Reptiles	Terrestrial	No	-	No	T	G4G5	S2	Nature Serve (2015): Found in edges of marshy or wet areas, forests, savannas, and agricultural landscapes.	Nature Serve (2015): Southern Texas through eastern Mexico, Belize, eastern and northern Guatemala, and in Honduras at low to moderate elevations. Locally on the Pacific slope in Oaxaca.	Nature Serve (2015): Approximately 100,000 - 1,000,000 individuals.
221.	*Nerodia harteri*	Brazos water snake	Reptiles	Freshwater Aquatic	No	-	No	T	G2	S1	Nature Serve (2015): Found along shorelines of impoundments, next to water's edge of fast-flowing rocky streams free of dense vegetation.	Nature Serve (2015): Only in the Brazos River drainage in north-central Texas.	Nature Serve (2015): Approximately 2,500 - 100,000 individuals.
222.	*Graptemys caglei*	Cagle's map turtle	Reptiles	Freshwater Aquatic	No	-	No	T	G3	S1	Nature Serve (2015): Optimal habitat includes riffles and pools, found in rivers with shallow to average depth and moderate flow with mostly silt or gravel substrates, as well as gravel bars connecting long pool areas.	Nature Serve (2015): Guadalupe River system of Texas including segments of the Guadalupe and San Marcos rivers.	Nature Serve (2015): Approximately 2,500 - 100,000 individuals.
223.	*Trimorphodon vilkinsonii*	Chihuahuan Desert lyre snake	Reptiles	Terrestrial	No	-	No	T	G4	S3	Nature Serve (2015): Found in mountains, hills, rock outcrops, canyons, fissured bluffs, and arroyos with dry, rocky terrain. In areas of desert plants or riparian vegetation, found on desert flats with creosote bush (*Larrea sp.*) or canyons with mesquite. TPWD (2017): Found in predominantly limestone-surfaced crevices of the desert.	Nature Serve (2015): Reported at elevations from at least 2,821 to 6,089 feet from southwestern New Mexico, in western Texas, and in Coahuila and Chihuahua Mexico.	Nature Serve (2015): Approximately 10,000 - 1,000,000 individuals.
224.	*Kinosternon hirtipes murrayi*	Chihuahuan mud turtle	Reptiles	Freshwater Aquatic	No	-	No	T	G5T5	S1	TPWD (2017): Prefers bodies of freshwater with much aquatic vegetation.	Klym (2008)[103]: Found in Presidio County, Texas.	Klym (2008): Very limited in Texas.

[102] NMFS and USFWS. 1998. Recovery plan for the US Pacific population of the hawksbill turtle (*Eretmochelys imbricata*). Silvery Spring, Maryland.
[103] Klym, M. 2008. An introduction to Texas turtles. Texas parks and wildlife. 17 pp.

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225.	*Nerodia paucimaculata*	Concho water snake	Reptiles	Freshwater Aquatic	No	Delisted	No	-	G2	S2	Nature Serve (2015): Inhabits fast-flowing rocky streams and their margins, specifically where flat, unshaded and unsilted rocks are at or close to the water's edge and at shallow riffles. Also occur along shorelines of lakes, ponds, and impoundments.	Nature Serve (2015): Only in the Colorado and Concho River drainages of Texas.	Nature Serve (2015): Approximately 10,000 – 1,000,000 individuals.
226.	*Sceloporus arenicola*	Dunes Sagebrush Lizard	Reptiles	Terrestrial	No	Not Listed	No		G2	S1	Nature Serve (2005): Found in the Monahan Sandhills in Texas. Occurs around active and semi-stabilized sand dunes.	Nature Serve (2005): 5,000 – 20,000 square kilometers in New Mexico and five Texas counties (Andrews, Crane, Gaines, Ward, and Winkler)	Nature Serve (2005): Approximately 10,000 – 1,000,000 individuals
227.	*Chelonia mydas*	Green sea turtle	Reptiles	Marine Aquatic	Yes	T	No	T	G3	S3	Nature Serve (2015): Found in convergence zones in the open ocean as well as shallow, low-energy waters with abundant submerged vegetation.	Nature Serve (2015): Atlantic, Pacific, and Indian oceans.	Nature Serve (2015): Approximately 100,000 to >1,000,000 individuals.
228.	*Lepidochelys kempii*	Kemp's ridley sea turtle	Reptiles	Marine Aquatic	Yes[104]	E, Petitioned for Critical Habitat: Findings Not Yet Made	No	E	G1	S3	Nature Serve (2015): Found in shallow coastal and estuarine waters with sandy or muddy substrates.	Nature Serve (2015): Adults only in Gulf of Mexico; immatures in Gulf of Mexico and Atlantic Ocean off coast of U.S.	Nature Serve (2015): Approximately 10,000 - 100,000 individuals.
229.	*Dermochelys coriacea*	Leatherback sea turtle	Reptiles	Marine Aquatic	Yes	E	Designated-Not in TX	E	G2	S1S2	Nature Serve (2015): Pelagic, often found near continental shelf; also in gulfs, bays and estuaries. Found on land only to breed and as hatchlings.	Nature Serve (2015): Circumglobal in temperate waters of the Atlantic, Indian, and Pacific Oceans. May travel hundreds or thousands of miles between nesting beaches and marine waters. Found along Atlantic, Gulf, and Pacific coasts of continental U.S., as well as Hawaii.	Nature Serve (2015): Approximately 10,000 - 1,000,000 individuals.
230.	*Caretta caretta*	Loggerhead sea turtle	Reptiles	Marine Aquatic	Yes	T	Designated- Not in TX	T	G1	S1	Nature Serve (2015): Found near shorelines in warm temperature and subtropical regions, mostly over the continental shelf and in lagoons, creeks, mouths of rivers, estuaries, and bays.	Nature Serve (2015): Rarely far from mainland shores, ranges into temperate zones in summer. Found in the warmer parts of the Atlantic, Indian, and Pacific oceans and Caribbean and Mediterranean seas.	Nature Serve (2015): Approximately 100,000 - 1,000,000 individuals.
231.	*Pituophis ruthveni*	Louisiana pine snake	Reptiles	Terrestrial	No	T	No	T	G2	S1	TPWD (2017): Found in mixed deciduous and longleaf pine (*Pinus palustris*) woodlands.	Nature Serve (2015): West and central Louisiana and the central portion of East Texas.	Nature Serve (2015): Estimated at a few thousand individuals.
232.	*Phrynosoma hernandesi*	Mountain short-horned lizard	Reptiles	Terrestrial	No	-	No	T	G5	S3	Nature Serve (2015): Often found in open, openly wooded, or shrubby areas with sparse ground level vegetation and rocky to sandy soils of semiarid plains to high mountains.	Nature Serve (2015): Southern Canada through eastern Montana, the Dakotas, Wyoming, Nebraska, Colorado, Utah, eastern Nevada, New Mexico, Arizona, and west Texas to southern Durango.	Nature Serve (2015): Approximately 10,000 - 1,000,000 individuals.
233.	*Leptodeira septentrionalis septentrionalis*	Northern cat-eyed snake	Reptiles	Terrestrial	No	-	No	T	G5	S2	TPWD (2017): Found in dense thickets bordering ponds and streams and in thorn brush woodlands.	Nature Serve (2015): Southern Texas to northwestern South America in northern Peru, Ecuador, Venezuela, and Colombia.	Nature Serve (2015): Approximately 100,000 to >1,000,000 individuals.
234.	*Cemophora coccinea copei*	Northern scarlet snake	Reptiles	Terrestrial	No	-	No	T	G5T5	S3	TPWD (2017): Occurs in mixed hardwood scrub on sandy soils.	Tennant (1998)[105]: Northeast and eastern edge of Texas.	Tennant (1998): Fairly common.
235.	*Crotaphytus reticulatus*	Reticulate collared lizard	Reptiles	Terrestrial	No	-	No	T	G3	S2	Nature Serve (2015): Occur in thorny shrubland/ chaparral; often found on rocks, but also on mesquite flats; burrows in soil and hides in fallen logs.	Nature Serve (2015): Southern Texas; Coahuila, Nuevo Leon, and Tamaulipas, Mexico.	Nature Serve (2015): Approximately 2,500 - 10,000 individuals.
236.	*Coleonyx reticulatus*	Reticulated gecko	Reptiles	Terrestrial	No	-	No	T	G3	S3	Nature Serve (2015): Found in rocky areas in desert regions, specifically limestone canyons.	Nature Serve (2015): Brewster and Presidio Counties of the Big Bend region of Texas into adjacent Mexico.	Hammerson (2007)[106]: More common in Texas than was previously believed, probably stable, but population information is inadequate.
237.	*Pseudemys gorzugi*	Rio Grande cooter	Reptiles	Freshwater Aquatic	No	Petitioned for Listing: 90 Day Substantial	No	-	G3G4	S2	Nature Serve (2015): Found in rivers and perennial tributaries with substrate of sand or rock.	Nature Serve (2015): Rio Grande and Pecos Rivers of Texas and southern New Mexico.	Nature Serve (2015): Approximately 2,500 - 100,000 individuals.

[104] NMFS, USFWS, Secretary of Environment and Natural Resources, Mexico (SEMARNAT). 2011. Bi-National Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), Second Revision. National Marine Fisheries Service. Silver Spring, Maryland.
[105] Tennant, A. 1998. A field guide to Texas snakes. Second Edition. Print.
[106] Hammerson, G.A. 2007. *Coleonyx reticulatus*. The IUCN Red List of Threatened Species 2007: e.T64037A12738857. Available at http://dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T64037A12738857.en. Accessed January 30, 2017.

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238.	*Liochlorophis vernalis*	Smooth green snake	Reptiles	Terrestrial	No	-	No	T	G5	SX	Nature Serve (2015): Found in marshes, meadows, grassy fields at forest edges, stream edges, mountain shrubland, moist open woodland, vacant lots, and abandoned farmland. TPWD (2017): Found in mesic coastal shortgrass prairie vegetation.	Nature Serve (2015): Across southern Canada south through New Jersey, Virginia, West Virginia, Maryland, Ohio, Indiana, Illinois, Missouri, Nebraska, New Mexico, Chihuahua, Utah, and disjunctly to southeastern Texas. TPWD (2017): Formerly found in the Gulf Coastal Plain.	Nature Serve (2015): Approximately 100,000 to >1,000,000 individuals.
239.	*Drymobius margaritiferus*	Speckled racer	Reptiles	Terrestrial	No	-	No	T	G5	S1	Nature Serve (2015): Found in a variety of habitats, including subtropical and tropical moist, wet, and dry primary and secondary forests. TPWD (2017): Found in areas with dense vegetation and litter on the ground, often in dense thickets near water or in riparian woodlands.	Nature Serve (2015): Southern Texas through much of Mexico, Central American, and into northern Colombia in South America.	Nature Serve (2015): Approximately 100,000 to >1,000,000 individuals.
240.	*Holbrookia lacerata*	Spot-tailed earless lizard	Reptiles	Terrestrial	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G3G4	S2	Nature Serve (2015): Found in moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation; also, oak-juniper woodlands and mesquite-prickly pear associations.	Nature Serve (2015): Central and southern Texas and northern Mexico.	Nature Serve (2015): Total population size is unknown, but appears to be uncommon or rare.
241.	*Phrynosoma cornutum*	Texas horned lizard	Reptiles	Terrestrial	No	-	No	T	G4G5	S4	Nature Serve (2015): Found in prairies, bajadas, dunes, foothills, playa edges, and deserts with open arid and semiarid regions with sparse vegetation of grass, cactus, scrubby trees, or brush. TPWD (2017): Hides under rocks or in rodent burrows when inactive. Burrows into soil, usually sandy to rocky.	Nature Serve (2015): Southwestern Missouri and central Kansas through southeastern Colorado, south through Oklahoma and Texas, into eastern and southern New Mexico, and southeastern Arizona to northeastern Mexico.	Nature Serve (2015): Approximately 10,000 to >1,000,000 individuals.
242.	*Drymarchon melanurus erebennus*	Texas indigo snake	Reptiles	Terrestrial	No	-	No	T	G5T4	S3	TPWD (2017): Found in dense riparian corridors of thornbush-chaparral woodlands. Also found in irrigated and suburban croplands. Requires moist microhabitats, such as rodent burrows.	TPWD (2017): South of the Balcones Escarpment and Guadalupe River in Texas.	Tennant (1998): Slowly declining in U.S.
243.	*Cemophora coccinea lineri*	Texas scarlet snake	Reptiles	Terrestrial	No	-	No	T	G5T2	S1S2	TPWD (2017): Found in mixed hardwood scrub on sandy soils.	Tennant (1998): Adjacent to Texas lower Gulf Coast.	Tennant (1998): Very rare.
244.	*Gopherus berlandieri*	Texas tortoise	Reptiles	Terrestrial	No	-	No	T	G4	S2	Nature Serve (2015): Found in sandy well-drained soils of open scrub woods, lomas, arid brush, grass-cactus associations. Found in shallow depressions at the base of cactus or bush or burrowed underground when inactive.	Nature Serve (2015): South of a line connecting Del Rio, Rockport, and San Antonio in Texas, through Coahuila into San Luis Potosi, Mexico.	National Park Service (2017)[107]: Historically widespread and abundant, but has decreased.
245.	*Crotalus horridus*	Timber rattlesnake	Reptiles	Terrestrial	No	-	No	T	G4	S4	Nature Serve (2015): Prefers hardwood forests, swampy areas, floodplains, river bottoms, hydric hammocks, or cane fields in the south. While deciduous forests and dry ridges interspersed with open areas are preferred in the Midwest. TPWD (2017): Found in abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto.	Nature Serve (2015): Florida to central New England, and west to eastern Texas, central Oklahoma, Kansas, and Nebraska. Also reported in Iowa and Minnesota.	Nature Serve (2015): Approximately 100,000 to >1,000,000 individuals.

[107] National Park Service. 2017. Texas tortoise monitoring. Available at https://science.nature.nps.gov/im/units/guln/monitor/texas_tortoise.cfm. Accessed January 30, 2017.

Red text denotes inclusion as a Covered Species.

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Migratory	Federal Status	Critical Habitat	TX State Status	Nature Serve Global Rank	Nature Serve State Rank	Habitat Notes	Range and Distribution Notes	Abundance Notes
246.	*Tantilla cucullata*	Trans-Pecos black-headed snake	Reptiles	Terrestrial	No	-	No	T	G3	S2	Nature Serve (2015): Found in rocky canyons with steep-sides and oak, juniper, and pinyon pine, as well as in hilly grasslands, streamside woodlands, and low hills of arid grasslands. Often found with creosote bush, yucca, agave (*Agave americana*), juniper, and cholla (*Cylindropuntia sp.*).	Nature Serve (2015): Trans-Pecos region of West Texas through the Big Bend region and east to Dolan Falls area in Val Verde County.	Nature Serve (2015): Approximately 2,500 - 1,000,000 individuals.
247.	*Deirochelys reticularia miaria*	Western chicken turtle	Reptiles	Freshwater Aquatic	No	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Petitioned	-	G5T5	SNR	USFWS (2016)[108]: Found in shallow and slow-moving waters of swamps, ponds, lakes, and streams.	TPWD (2008): Eastern third of Texas as far west as Dallas/Fort Worth; west of the Mississippi River, in Louisiana, Arkansas, Missouri, and Oklahoma.	USFWS (2016): Unknown but presumed to be rare and declining.

[108] USFWS. 2016. Western Chicken Turtle. Factsheet. Arlington, Texas ecological services field office. 2 pp.

Ref. No.	Scientific Name	Common Name	HCP Covered Species ?	Vegetation Clearing[1]	Vegetation Maintenance	Soil Disturbance / Surface grading	Excavation	Nuisance (noise/light/ activity)	Collision/ Avoidance	Fill (aquatic habitats)	Consider Measures for Avoidance or Minimization	Overall Assessment (Exposure and Effects)	Notes and Discussion
1.	*Eurycea waterlooensis*	Austin blind salamander	No	1	1	1	1	0	0	1	X	1	Although this species is federally listed, and LCRA TSC Activities may occur over the Edwards Aquifer, impacts on the surface or shallow subsurface should have minimal effects on the species or its deep aquifer habitat. Consider measures to minimize impacts to water quality during construction.
2.	*Eurycea sosorum*	Barton Springs salamander	Yes	2	1	2	1	0	0	1	X	2	Species is federally listed, and LCRA TSC Activities may occur in proximity to spring outlets and spring runs occupied by the species. Species may occur more widely than currently documented. Vegetation clearing or maintenance, and soil disturbance could affect surface habitat for this species.
3.	*Notophthalmus meridionalis*	Black-spotted newt	No	2	1	2	1	1	0	3	X	1	Species is petitioned for federal listing with positive 90-day finding and may occur near areas with exposure to the LCRA TSC Activities. While LCRA TSC typically avoids impacts to wetlands and aquatic habitats, there is potential for impacts during construction from vegetation clearing, soil disturbance, and fill within the small or temporary water bodies used by the species. However, the likelihood of actual listing is uncertain at this time.
4.	*Eurycea robusta*	Blanco blind salamander	No	1	1	1	1	0	0	1	X	1	Species is petitioned for federal listing with positive 90-day finding and LCRA TSC Activities may occur over the Edwards Aquifer. However, impacts on the surface or shallow subsurface should have minimal effects on the species or its deep-aquifer habitat. Consider measures to minimize impacts to water quality during construction.
5.	*Eurycea latitans*	Cascade Caverns salamander	No	2	1	2	1	0	0	1	X	2	Species is petitioned for federal listing with positive 90-day finding and LCRA TSC Activities may occur in proximity to spring outlets and spring runs occupied by the species. Species may occur more widely than currently documented. Vegetation clearing or maintenance, and soil disturbance could affect surface habitat for this species. However, the likelihood of actual listing is uncertain at this time.
6.	*Eurycea tridentifera*	Comal blind salamander	No	1	1	1	1	0	0	1	X	1	Species is petitioned for federal listing and LCRA TSC Activities may occur over the Edwards Aquifer, impacts on the surface or shallow subsurface should have minimal effects on the species or its deep aquifer habitat. Consider measures to minimize impacts to water quality during construction.
7.	*Eurycea* sp. 8	Comal Springs salamander	No	2	1	2	1	0	0	1	X	2	Species is petitioned for federal listing with positive 90-day finding and may occur in areas with exposure to the LCRA TSC Activities. There is potential for impacts during construction or ongoing from vegetation clearing, soil disturbance, and fill within the small or temporary water bodies used by the species. However, the likelihood of actual listing is uncertain at this time.
8.	*Eurycea naufragia*	Georgetown salamander	Yes	2	1	2	1	0	0	1	X	2	Species is federally listed, and LCRA TSC Activities may occur in proximity to spring outlets and spring runs occupied by the species. Species may occur more widely than currently documented. Vegetation clearing or maintenance, and soil disturbance could affect surface habitat for this species.
9.	*Anaxyrus (syn. Bufo) houstonensis*	Houston toad	Yes	3	2	3	2	1	1	1	X	3	Species is federally listed and occurs in a broad region where LCRA TSC Activities may occur. There is potential for impacts associated with a variety of Potential Effect Pathways.
10.	*Eurycea tonkawae*	Jollyville Plateau salamander	Yes	2	1	2	1	0	0	1	X	2	Species is federally listed, and LCRA TSC Activities may occur in proximity to spring outlets and spring runs occupied by the species. Vegetation clearing or maintenance, and soil disturbance could affect surface habitat for this species.
11.	*Rhinophrynus dorsalis*	Mexican burrowing toad	No	1	1	3	3	0	0	2		1	Species is not federally listed, and future listing seems unlikely given its broad overall range and estimated abundance. Species has a very restricted range in Texas and little exposure to LCRA TSC Activities.
12.	*Smilisca baudinii*	Mexican treefrog	No	3	1	1	0	0	0	2		1	Species is not federally listed, and future listing seems unlikely given its broad overall range and estimated abundance. Species has a very restricted range in Texas and little exposure to LCRA TSC Activities.
13.	*Eurycea chisholmensis*	Salado Springs salamander	Yes	2	1	2	1	0	0	1	X	2	Species is federally listed, and LCRA TSC Activities may occur in proximity to spring outlets and spring runs occupied by the species. Species may occur more widely than currently documented. Vegetation clearing or maintenance, and soil disturbance could affect surface habitat for this species.

[1] 0) none- not possible to impact
1) low- possible but not expected
2) medium- 50/50 chance
3) likely- expected or probably yes

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14.	*Eurycea nana*	San Marcos salamander	Yes	2	1	2	1	0	0	1	X	2	Species is federally listed, and LCRA TSC Activities may occur in proximity to spring outlets and spring runs occupied by the species. Species may occur more widely than currently documented. Vegetation clearing or maintenance, and soil disturbance could affect surface habitat for this species.
15.	*Hypopachus variolosus*	Sheep frog	No	3	1	2	2	0	0	2		1	Species is not federally listed, and future listing seems unlikely given its broad overall range and estimated abundance.
16.	*Siren* sp 1	South Texas siren (large form)	No	1	0	1	0	0	0	3		1	Species is not federally listed, and future listing potential is unknown. However, exposure of this aquatic species to LCRA TSC Activities is low given its ability to span waterways and wetlands.
17.	*Typhlomolge (syn. Eurycea) rathbuni*	Texas blind salamander	No	1	1	1	1	0	0	1	X	1	Although this species is federally listed and LCRA TSC Activities may occur over the Edwards Aquifer, impacts on the surface or shallow subsurface should have minimal effects on the species or its deep aquifer habitat. Consider measures to minimize impacts to water quality during construction.
18.	*Eurycea neotenes*	Texas salamander	No	2	1	2	1	0	0	1	X	2	Species is petitioned for federal listing with positive 90-day finding and LCRA TSC Activities may occur in areas occupied by the species. Species may occur more widely than currently documented. Vegetation clearing or maintenance, and soil disturbance could affect surface habitat for this species. However, the likelihood of actual listing is uncertain at this time.
19.	*Leptodactylus fragilis*[2]	White-lipped frog	No	3	1	1	0	0	0	2		1	Species is not federally listed, and future listing seems unlikely given its broad overall range and estimated abundance.
20.	*Texella reddelli*	Bee Creek Cave harvestman	Yes	1	1	2	3	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented, since the species is now known to not be a true troglobite. This species could be affected by activities that involve excavation or surface disturbance.
21.	*Texella reyesi*	Bone Cave harvestman	No	1	1	2	3	0	0	0	X	2	Species is federally listed (and petitioned for delisting) and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance. Not included as a Covered Species due to commitment by LCRA TSC to rely on existing programmatic HCPs for take authorization.
22.	*Cicurina venii*	Braken Bat Cave meshweaver	No	0	0	2	0	0	0	0		0	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance. Hedin et al. (2018)[3] suggests synonomy with *Cicurina madla*, making *C. venii* not a valid taxon.
23.	*Texella cokendolpheri*	Cokendolpher Cave harvestman	No	1	1	2	3	0	0	0	X	2	Species is federally listed and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance. Not included as a Covered Species due to commitment by LCRA TSC to rely on existing programmatic HCPs for take authorization.
24.	*Cicurina vespera*	Government Canyon Bat Cave meshweaver	No	1	1	2	3	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance. Not included as a Covered Species due to commitment by LCRA TSC to rely on existing programmatic HCPs for take authorization.
25.	*Tayshaneta microps*	Government Canyon Bat Cave spider	Yes	1	1	2	3	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance.
26.	*Cicurina madla*	Madla Cave meshweaver	Yes	1	1	2	3	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance.
27.	*Cicurina baronia*	Robber Baron Cave meshweaver	No	1	1	2	3	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance. Not included as a Covered Species due to commitment by LCRA TSC to rely on existing programmatic HCPs for take authorization.

[2] Frost, Darrel R. 2016. Amphibian Species of the World: an Online Reference. Version 6.0 (Accessed 1/17/2017). Electronic Database accessible at http://research.amnh.org/herpetology/amphibia/index.html. American Museum of Natural History, New York, USA.

[3] Hedin, M., S. Derkarabetian, J. Blair, and P. Paquin. 2018. Sequence capture phylogenomics of eyeless *Cicurina* spiders from Texas caves, with emphasis on US federally-endangered species from Bexar County (Araneae, Hahniidae). *ZooKeys* 769:49-76.

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28.	*Cicurina loftini*	no common name	No	1	1	2	3	0	0	0	X	2	Species is not federally listed but LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance. Hedin et al. (2018) suggests *Cicurina loftini* may be synonymous with C. vespera, a federally listed species. Species due to commitment by LCRA TSC to rely on existing programmatic HCPs for take authorization.
29.	*Tartarocreagris texana*	Tooth Cave pseudoscorpion	No	1	1	2	3	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance. Not included as a Covered Species due to commitment by LCRA TSC to rely on existing programmatic HCPs for take authorization.
30.	*Tayshaneta myopica*	Tooth Cave spider	Yes	1	1	2	3	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance.
31.	*Falco peregrinus anatum*	American peregrine falcon	No	1	1	0	0	1	1	0	X	1	Species has been delisted. Consider measures to minimize risk of collisions and electrocutions.
32.	*Tympanuchus cupido attwateri*	Attwater's greater prairie-chicken	No	2	1	1	0	3	2	0	X	2	Species is federally listed but, with known occurrences only on dedicated conservation lands, is unlikely to be exposed to the effects of LCRA TSC Activities. The species is not likely to be exposed to the LCRA TSC Activities. Consider measures to avoid known localities during routing and siting. Consider measures to minimize risk of collisions and electrocutions.
33.	*Peucaea aestivalis*	Bachman's sparrow	No	3	1	0	0	1	1	0	X	1	Species considered for federal listing but removed from the candidate list in the early 1990s. Species is not likely to be reconsidered for federal listing in the foreseeable future. Consider measures to minimize risk of collisions and electrocutions.
34.	*Haliaeetus leucocephalus*	Bald eagle	No	1	1	0	0	2	2	1	X	2	Species has been delisted but remains protected by Bald and Golden Eagle Protection Act. Consider measures to minimize collision and electrocution risk, and to discourage use of transmission towers as nest sites.
35.	*Laterallus jamaicensis*	Black rail	No	2	1	0	0	2	2	1	X	2	Species petitioned for listing with a positive 90-day finding. Species occurs in coastal marshes that are unlikely to be exposed to LCRA TSC Activities. Consider conservation measures to avoid likely habitats and to minimize risk of collisions and electrocutions.
36.	*Vireo atricapilla*	Black-capped vireo	No	3	3	0	0	1	1	0	X	3	Species has been delisted. Consider measures to minimize risk of collisions.
37.	*Glaucidium brasilianum cactorum*	Cactus ferruginous pygmy-owl	No	3	1	0	0	2	1	0	X	1	Species has been delisted; although, the Texas population was never federally listed. Consider measures to minimize risk of collisions and electrocutions.
38.	*Buteogallus anthracinus*	Common black-hawk	No	2	1	0	0	2	1	1	X	1	Species is not federally listed, and future listing seems unlikely given the species' wide range and stable population. This highly localized nesting species in west Texas is not likely to be exposed to LCRA TSC Activities. Consider measures to minimize risk of collisions and electrocutions.
39.	*Numenius borealis*	Eskimo curlew	No	0	0	0	0	0	0	0	X	0	Species presumed extinct.
40.	*Setophaga chrysoparia*	Golden-cheeked warbler	Yes	3	2	0	0	1	1	0	X	3	Species is federally listed (petitioned for delisting with negative 90-day finding). LCRA TSC Activities may occur in areas of occupied habitat and impacts are possible. Consider measures to minimize risk of collisions and electrocutions.
41.	*Vermivora chrysoptera*	Golden-winged warbler	No	1	1	0	0	0	1	0	X	1	Species is petitioned for listing with a positive 90-day finding. Species does not nest or overwinter in Texas but may migrate across the eastern part of the state. Exposure to LCRA TSC Activities is possible during migration, but the likelihood of impact is low. Consider measures to minimize risk of collisions and electrocutions.
42.	*Buteo plagiatus (syn. Asturina nitida)*	Gray hawk	No	2	1	0	0	2	1	1	X	1	Species is not federally listed, and future listing seems unlikely given the species' wide range and relatively large population. This highly localized occurrences in Texas is not likely to be exposed to LCRA TSC Activities. Consider measures to minimize risk of collisions and electrocutions.
43.	*Sterna antillarum athalassos*	Interior least tern	No	1	1	1	0	2	2	1	X	1	Species is federally listed but nesting colonies are unlikely to occur in areas that may be exposed to LCRA TSC Activities. Species is mostly found along major rivers or shores of water bodies and could collide with transmission lines. Consider measures to minimize risk of collisions and electrocutions.

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44.	*Tympanuchus pallidicinctus*	Lesser prairie-chicken	No	1	1	0	0	1	1	0	X	1	Species is petitioned for federal listing with a positive 90-day finding. Species unlikely to be exposed to LCRA TSC Activities in the near future and participation in existing conservation programs could address the need for take authorization. Consider measures to minimize risk of collisions and electrocutions.
45.	*Strix occidentalis lucida*	Mexican spotted owl	No	1	1	0	0	1	1	0	X	1	Species is federally listed but occurs in remote and rugged habitats where it is not likely to be exposed to the LCRA TSC Activities. Consider measures to minimize risk of collisions and electrocutions.
46.	*Falco femoralis septentrionalis*	Northern aplomado falcon	No	1	1	1	0	1	2	0	X	1	Species is federally listed, and LCRA TSC Activities may occur in areas occupied by the species. Vegetation clearing and/or maintenance could impact the species. Species may also collide with transmission lines or be disturbed by nuisance, with a slight possibility of nesting on a structure. Consider measures to minimize risk of collisions and electrocutions.
47.	*Camptostoma imberbe*	Northern beardless-tyrannulet	No	3	1	0	0	0	1	0	X	1	Species is not federally listed, and future listing seems unlikely due to the species' wide range and relatively large global population. Consider measures to minimize risk of collisions and electrocutions.
48.	*Charadrius melodus*	Piping plover	Yes	1	1	1	0	2	2	1	X	2	Species is federally listed and occurs in areas where it may be exposed to the LCRA TSC Activities. Species occurs in non-breeding season on coastal beaches and mud flats except when migrating with some potential for activities to occur close to coastal wintering habitats and potential for collision with transmission lines. Consider measures to minimize risk of collisions and electrocutions.
49.	*Calidris canutus rufa*	Red knot	Yes	0	0	0	0	1	2	0	X	1	Species is federally listed and winters coastally and migrates across parts of Texas where LCRA TSC Activities may occur. There is a possibility of collision with transmission lines, if lines are located close to appropriate shorebird stopover habitat. Consider measures to minimize risk of collisions and electrocutions.
50.	*Picoides borealis*	Red-cockaded woodpecker	Yes	3	2	1	0	2	1	0	X	2	Species is federally listed and occurs in habitats that may be crossed by LCRA TSC Activities. Species may be impacted by vegetation clearing and construction-related activities. Consider measures to minimize risk of collisions and electrocutions.
51.	*Amazona viridigenalis*	Red-crowned parrot	No	2	1	0	0	1	2	0	X	1	Species is federally listed but is most common in urban areas of the Lower Rio Grande Valley. Potential for exposure to LCRA TSC Activities is low and potential for impact is also low. Consider measures to minimize risk of collisions and electrocutions.
52.	*Egretta rufescens*	Reddish egret	No	1	1	1	0	2	2	0	X	1	Species is not federally listed but occurs in areas that are unlikely to be exposed to the LCRA TSC Activities (i.e., coastal mudflat and beach habitats). Likelihood of future listing is low due to the species' wide range and relatively abundant population. Consider measures to minimize risk of collisions and electrocutions.
53.	*Pachyramphus aglaiae*	Rose-throated becard	No	1	1	0	0	1	1	0	X	1	Species is not federally listed and is generally a rare species that does not nest regularly in the state. Species is unlikely to be exposed to LCRA TSC Activities. Consider measures to minimize risk of collisions and electrocutions.
54.	*Sterna fuscata*	Sooty tern	No	0	0	0	0	1	1	0	X	1	Species is not federally listed and occurs mostly over open oceans. When on-shore, usually on coastal beach, it is unlikely to be impacted by LCRA TSC Activities. Consider measures to minimize risk of collisions and electrocutions.
55.	*Empidonax traillii extimus*	Southwestern willow flycatcher	No	3	3	0	0	1	1	0	X	2	Species is federally listed and occurs in areas that could be exposed to LCRA TSC Activities. Species could be impacted by clearing or modification of breeding habitat. Consider measures to minimize risk of collisions and electrocutions.
56.	*Elanoides forficatus*	Swallow-tailed kite	No	2	1	0	0	2	1	0	X	1	Species is not federally listed, and future listing seems unlikely given the species' relatively large population within a wide range. Consider measures to minimize risk of collisions and electrocutions.
57.	*Peucaea botterii texana*	Texas Botteri's sparrow	No	2	1	0	0	1	1	0	X	1	Species is not federally listed, and future listing seems unlikely given the species' wide range and relatively abundant population. Consider measures to minimize risk of collisions and electrocutions.
58.	*Setophaga pitiayumi*	Tropical parula	No	3	1	0	0	0	1	0	X	1	Species is not federally listed, and future listing seems unlikely due to the species' wide range and abundant population. Consider measures to minimize risk of collisions and electrocutions.
59.	*Coccyzus americanus*	Western yellow-billed cuckoo	No	3	1	0	0	1	2	0	X	2	Species is federally listed but is unlikely to occur in areas that may be exposed to LCRA TSC Activities. Species may be impacted by vegetation clearing and modification. Consider measures to minimize risk of collisions and electrocutions.

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60.	*Plegadis chihi*	White-faced ibis	No	2	1	0	0	1	1	2	X	1	Species is not federally listed, and future listing seems unlikely due to the species' wide range and abundant population. Consider measures to minimize risk of collisions and electrocutions.
61.	*Geranoaetus (syn. Buteo) albicaudatus*	White-tailed hawk	No	1	1	0	0	1	1	0	X	1	Species is not federally listed, and future listing seems unlikely due to the species' wide range and abundant population. These birds commonly perch on transmission line structures, so consider measures to minimize risk of collisions and electrocutions.
62.	*Grus americana*	Whooping crane	Yes	1	1	0	0	3	2	1	X	2	Species is federally listed and there is some potential for activities to occur in or close to wintering range. The migration corridor covers a large portion of the state and migrating birds could collide with transmission lines. Consider measures to minimize risk of collisions and electrocutions.
63.	*Mycteria americana*	Wood stork	No	1	1	1	0	2	3	2	X	1	Species is federally listed but does not nest in the state – limiting its exposure to the LCRA TSC Activities. This species is a rare migratory visitor. Consider measures to minimize risk of collisions and electrocutions.
64.	*Buteo albonotatus*	Zone-tailed hawk	No	1	1	0	0	3	1	0	X	1	Species is not federally listed, and future listing seems unlikely given an increasing population. Consider measures to minimize risk of collisions and electrocutions.
65.	*Gammarus hyalelloides*	Diminutive amphipod	No	1	1	1	1	0	0	1	X	1	Species is federally listed but has a highly restricted range that makes it unlikely to be exposed to the LCRA TSC Activities. Consider measures to avoid limited known occurrences.
66.	*Orconectes maletae*	Kisatchie painted crayfish	No	1	1	2	1	0	0	0		1	Species is petitioned for federal listing with a positive 90-day finding. The species' range in Texas is at the extreme edge of the Plan Area and it is unlikely to be exposed to the LCRA TSC Activities.
67.	*Stygobromus pecki*	Peck's cave amphipod	Yes	1	1	1	1	0	0	1	X	1	Species is federally listed and there is some potential for activities in and around occupied spring systems to affect the species, as it "…is often found in large numbers associated with the major spring runs at Comal [Springs]" (Bio-West, Inc. 2009)[4]. Given the frequency and abundance with which this species is found in surface aquatic habitats (in stream bottom detritus) at spring outlets, and its apparent dependence on groundwater discharge even in these surface habitats, vegetation clearing and management or soil disturbance at the surface could impact the species. Consider measures to protect water quality.
68.	*Gammarus pecos*	Pecos amphipod	No	1	1	1	1	0	0	1	X	1	Species is federally listed but has a highly restricted range unlikely to be exposed to or impacted by LCRA TSC Activities. Consider measures to minimize impacts to water quality.
69.	*Notropis girardi*	Arkansas River shiner	No	1	0	1	0	0	0	1	X	1	Species is federally listed but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
70.	*Macrhybopsis tetranema*	Peppered chub	No	1	1	0	0	0	0	1	X	1	Species is petitioned for federal listing with a positive 90-day finding but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
71.	*Gambusia gaigei*	Big Bend gambusia	No	0	0	0	0	0	0	0		0	Species is federally listed but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Known populations are within protected lands (Big Bend National Park), unless new populations are found it is not expected to be impacted.
72.	*Percina maculata*	Blackside darter	No	1	0	1	0	0	0	0		1	Species is not federally listed, and large range and population make future listing unlikely. Species occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities.
73.	*Gambusia senilis*	Blotched gambusia	No	0	0	0	0	0	0	0		0	Species is extirpated from the state.
74.	*Cycleptus elongatus*	Blue sucker	No	1	0	1	0	0	0	0		1	Species is not federally listed but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities.
75.	*Pteronotropis hubbsi*	Bluehead shiner	No	1	1	1	0	0	0	0	X	1	Species is petitioned for federal listing with a positive 90-day finding but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
76.	*Notropis simus simus*	Bluntnose shiner	No	0	0	0	0	0	0	0		0	Sub-species is believed extinct.

[4] Bio-West, Inc. 2009. Analysis of Species Requirements in Relation to Spring Discharge Rates and Associated Withdrawal Reductions and Stages for Critical period management of the Edwards Aquifer. Report to the Steering Committee for the Edwards Aquifer Recovery Implementation Program. Available at: http://eaahcp.org/wp-content/uploads/2019/02/Appendix-D.pdf. Accessed on June 28, 2019.

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Ref. No.	Scientific Name	Common Name	HCP Covered Species ?	Vegetation Clearing[1]	Vegetation Maintenance	Soil Disturbance / Surface grading	Excavation	Nuisance (noise/light/ activity)	Collision/ Avoidance	Fill (aquatic habitats)	Consider Measures for Avoidance or Minimization	Overall Assessment (Exposure and Effects)	Notes and Discussion
77.	*Ictalurus sp. 1*	Chihuahua catfish	No	1	1	1	1	0	0	1	X	1	Species is petitioned for federal listing with a positive 90-day finding but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
78.	*Notropis chihuahua*	Chihuahua shiner	No	1	0	1	0	0	0	0	X	1	Species is petitioned for federal listing with a positive 90-day finding but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
79.	*Gambusia heterochir*	Clear Creek gambusia	No	1	1	0	0	0	0	0	X	1	Species is federally listed but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Species has a highly restricted range. Consider measures to avoid aquatic habitats.
80.	*Cyprinodon elegans*	Comanche Springs pupfish	No	1	1	0	0	0	0	0	X	1	Species is federally listed but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Species has a highly restricted range. Consider measures to avoid aquatic habitats.
81.	*Cyprinodon eximius*	Conchos pupfish	No	1	0	1	0	0	0	0		1	Species is not federally listed and occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Future listing seems unlikely given the species' relatively large population across its range.
82.	*Dionda diaboli*	Devils River minnow	No	1	1	1	1	0	0	1	X	1	Species is federally listed but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Species has a highly restricted range. Consider measures to avoid aquatic habitats.
83.	*Etheostoma fonticola*	Fountain darter	No	1	0	0	0	0	0	0	X	1	Species is federally listed but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Species has a highly restricted range. Consider measures to avoid aquatic habitats.
84.	*Cyprinodon bovinus*	Leon Springs pupfish	No	1	1	0	0	0	0	0	X	1	Species is federally listed but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Species has a highly restricted range. Consider measures to avoid aquatic habitats.
85.	*Prietella phreatophila*	Mexican blindcat	No	0	0	0	1	0	0	0		0	Species uses deep aquifer habitats and is unlikely to be exposed to the effects of LCRA TSC Activities.
86.	*Ctenogobius claytonii*	Mexican goby	No	1	0	1	0	0	0	0		1	Species is not federally listed and occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Species has a highly restricted range and may be extirpated from Texas.
87.	*Campostoma ornatum*	Mexican stoneroller	No	1	0	1	0	0	0	0		1	Species is not federally listed and occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities.
88.	*Cyprinella sp. 2*	Nueces shiner	No	1	1	1	1	0	0	1		1	Species was petitioned for federal listing but deemed not warranted.
89.	*Microphis brachyurus*	Opossum pipefish	No	1	0	1	0	0	0	0		1	Species is not federally listed and occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities.
90.	*Polyodon spathula*	Paddlefish	No	1	0	1	0	0	0	0		1	Species is not federally listed and occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Future listing seems unlikely given the species' relatively large population across its range.
91.	*Gambusia nobilis*	Pecos gambusia	No	1	0	0	0	0	0	0	X	1	Species is federally listed but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Species has a highly restricted range. Consider measures to avoid aquatic habitats.
92.	*Cyprinodon pecosensis*	Pecos pupfish	No	1	1	0	0	0	0	1	X	1	Species is petitioned for federal listing with a positive 90-day finding but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
93.	*Cyprinella lepida*	Plateau shiner	No	1	1	1	1	0	0	1		1	Species was petitioned for federal listing but deemed not warranted.
94.	*Macrhybopsis australis*	Prairie chub	No	1	1	1	1	0	0	1	X	1	Species is petitioned for listing with a positive 90-day finding. Species occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
95.	*Cyprinella proserpina*	Proserpine shiner	No	1	0	1	0	0	0	0		1	Species is not federally listed and occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities.
96.	*Gila pandora*	Rio Grande chub	No	0	0	0	0	0	0	0		0	Species is not federally listed and occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Species has a highly restricted range.

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97.	*Etheostoma grahami*	Rio Grande darter	No	1	0	1	0	0	0	0		1	Species is not federally listed and occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities.
98.	*Hybognathus amarus*	Rio Grande silvery minnow	No	0	0	0	0	0	0	0		0	Species is considered extirpated from Texas.
99.	*Awaous banana*	River goby	No	1	0	1	0	0	0	0	X	1	Species is not federally listed and occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Future listing seems unlikely given the species' relatively large population across its range.
100.	*Gambusia clarkhubbsi*	San Felipe gambusia	No	1	1	0	0	0	0	1	X	1	Species is petitioned for listing with a positive 90-day finding. Species occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
101.	*Gambusia georgei*	San Marcos gambusia	No	0	0	0	0	0	0	0		0	Species is presumed extinct.
102.	*Notropis oxyrhynchus*	Sharpnose shiner	No	1	1	0	1	0	0	0	X	1	Species is federally listed but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
103.	*Scaphirhynchus platorynchus*	Shovelnose sturgeon	No	1	1	0	0	0	0	0		0	Species is federally listed due to similarity of appearance with the pallid sturgeon, but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities.
104.	*Notropis buccula*	Smalleye shiner	No	1	1	0	1	0	0	0	X	1	Species is federally listed but occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
105.	*Pristis pectinata*	Smalltooth sawfish	No	0	0	0	0	0	0	0		0	Extirpated from the state.
106.	*Trogloglanis pattersoni*	Toothless blindcat	No	0	0	1	1	0	0	1	X	1	Species is federally listed but occurs in deep aquifer aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to protect water quality.
107.	*Erimyzon oblongus*	Western Creek chubsucker	No	1	0	1	0	0	0	0		1	Species is not federally listed and occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Future listing seems unlikely given the species' relatively large population across its range.
108.	*Satan eurystomus*	Widemouth blindcat	No	0	0	1	1	0	0	1	X	1	Species is federally listed but occurs in deep aquifer aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to protect water quality.
109.	*Rhadine exilis*	A ground beetle with no common name	Yes	1	1	2	2	0	0	0	X	2	Species is federally listed and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance.
110.	*Rhadine infernalis*	A ground beetle with no common name	Yes	1	1	2	2	0	0	0	X	2	Species is federally listed and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance.
111.	*Nicrophorus americanus*	American burying beetle	No	1	1	2	2	1	0	0		2	Species is federally listed (petitioned for delisting) but does not occur widely in Texas. LCRA TSC Activities are unlikely to occur within the known range of the species.
112.	*Batrisodes texanus*	Inner Space Cavern mold beetle	No	1	1	2	2	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance. Not included as a Covered Species due to commitment by LCRA TSC to rely on existing programmatic HCPs for take authorization.
113.	*Batrisodes cryptotexanus*	Dragonfly Cave mold beetle	No	1	1	2	2	0	0	0	X	2	Species is federally listed and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance. Not included as a Covered Species due to commitment by LCRA TSC to rely on existing programmatic HCPs for take authorization.

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114.	*Stygoparnus comalensis*	Comal Springs dryopid beetle	No	1	1	1	1	0	0	1	X	1	Species is federally listed, and LCRA TSC Activities may occur in proximity to spring outlets where the species is known to occur. However, this species has been described as stygobitic (i.e., living exclusively in groundwater) and, while it has been very occasionally found in surface waters near spring outlets, it is unlikely to rely on such surface habitats (i.e., "…it is presumed that these subterranean invertebrates [including the Comal Springs dryopid beetle] are not suited for survival in surface conditions…;" Bio-West, Inc. 2018)[5]. Therefore, this species is unlikely to be affected by clearing or maintenance of vegetation or soil disturbances at the surface.
115.	*Heterelmis comalensis*	Comal Springs riffle beetle	Yes	1	1	1	1	0	0	1	X	1	Species is federally listed, and LCRA TSC Activities may occur in proximity to spring outlets and spring runs occupied by the species. Species may occur more widely than currently documented. Vegetation clearing or maintenance, and soil disturbance could affect surface habitat for this species.
116.	*Haideoporus texanus*	Edwards Aquifer diving beetle	No	1	1	1	1	0	0	1	X	1	Species is petitioned for federal listing with a positive 90-day finding. LCRA TSC Activities may occur over the Edwards Aquifer, but are unlikely to impact this deep-aquifer species. Consider measures to minimize water quality impacts.
117.	*Batrisodes venyivi*	Helotes mold beetle	Yes	1	1	2	2	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance.
118.	*Texamaurops reddelli*	Kretschmarr Cave mold beetle	No	1	1	2	2	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance. Not included as a Covered Species due to commitment by LCRA TSC to rely on existing programmatic HCPs for take authorization.
119.	*Automeris louisiana*	Louisiana eyed silkmoth	No	2	1	1	0	1	0	0		1	Species is petitioned for listing with a positive 90-day finding. Habitat could be disturbed by vegetation manipulation, but the species is restricted to the coastal prairie of extreme southeast Texas and is unlikely to be exposed to LCRA TSC Activities.
120.	*Danaus plexippus plexippus*	Monarch butterfly	No	3	3	0	0	1	2	0	X	2	Species is petitioned for federal listing with a positive 90-day finding. However, actual likelihood of listing is uncertain at this time. Vegetation manipulation and grading could disturb breeding habitat, including causing destruction of eggs, caterpillars, or chrysalises. There is potential for exposure and impacts from the LCRA TSC Activities.
121.	*Lepidostoma morsei*	Morse's little plain brown sedge	No	2	2	0	0	1	0	0	X	1	Species is petitioned for federal listing with a positive 90-day finding. Eggs and larva are aquatic and not likely to be impacted by the LCRA TSC Activities. Adults could be present in vegetation along the margins of a stream. Consider measures to avoid contact with adults, such as seasonal restrictions on activities.
122.	*Somatochlora margarita*	Texas emerald	No	1	1	0	0	0	0	0	X	1	Species is petitioned for federal listing with a positive 90-day finding. Species' restricted range and habitat type suggest a low likelihood of exposure to the LCRA TSC Activities. Consider measures to avoid contact with adults, such as seasonal restrictions on activities.
123.	*Lirceolus smithii*	Texas troglobitic water slater	No	0	0	1	1	0	0	0	X	1	Species is petitioned for federal listing with a positive 90-day finding. LCRA TSC Activities may occur over the Edwards Aquifer, but are unlikely to impact this deep-aquifer species. Consider measures to minimize water quality impacts.
124.	*Rhadine persephone*	Tooth Cave ground beetle	Yes	1	1	2	2	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities may occur in areas that could have suitable habitat. Species may occur more widely than currently documented. This species could be affected by activities that involve excavation or surface disturbance.
125.	*Ursus americanus*	Black bear	No	1	0	0	0	1	0	0		1	Species is not federally listed and is restricted in regular occurrence to mountainous regions of Trans Pecos. Species is not likely to be exposed to the LCRA TSC Activities in a manner that would cause significant impact.
126.	*Mustela nigripes*	Black-footed ferret	No	0	0	0	0	0	0	0		0	Species is extirpated from Texas.
127.	*Oryzomys couesi*	Coues' rice rat	No	2	1	2	1	0	0	0		1	Species is not federally listed and is highly range-restricted. Future listing seems unlikely due to the species' wide range and potentially large population. Species is not likely to be exposed to the LCRA TSC Activities.
128.	*Herpailurus yagouaroundi cacomitli*	Gulf Coast jaguarundi	No	2	1	1	0	2	1	0	X	1	Species is federally listed but may no longer occur in Texas despite anecdotal reports.

[5] Bio-West, Inc. 2018. Memorandum: Item M Net Disturbance and Incidental Take Assessment for 2018 EARIP ITP Annual Report. Ed Oborny (Bio-West, Inc.) to Scott Storment and Chad Furl. December 26, 2018. Available at: http://eaahcp.org/flow-protection-measures/net-disturbance-incidental-take/. Accessed on June 28, 2019.

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129.	*Canis lupus*	Gray wolf	No	0	0	0	0	0	0	0		0	Species is extirpated from Texas.
130.	*Panthera onca*	Jaguar	No	0	0	0	0	0	1	0		1	Species is at best an extremely rare visitor and unlikely to be exposed to LCRA TSC Activities.
131.	*Ursus americanus luteolus*	Louisiana black bear	No	1	1	0	0	1	0	0		1	Species has been delisted.
132.	*Leopardus wiedii*	Margay	No	0	0	0	0	0	0	0		0	Species is extirpated from Texas.
133.	*Leptonycteris nivalis*	Mexican long-nosed bat	No	1	1	0	0	1	1	0	X	1	Species is federally listed but is unlikely to be impacted by the LCRA TSC Activities. Habitat could be disturbed by vegetation clearing or maintenance, although species largely occurs in remote, rugged areas where LCRA TSC Activities are unlikely to occur. Consider measures to avoid removal of agave plants.
134.	*Leopardus pardalis*	Ocelot	Yes	3	1	1	0	2	1	0	X	2	Species is federally listed, and LCRA TSC Activities could affect habitat used by the species. Species could be disturbed by vegetation clearing or maintenance, or through nuisance.
135.	*Peromyscus truei comanche*	Palo Duro mouse	No	2	1	2	2	1	0	0		1	Species is not federally listed. Species is restricted to rugged caprock near Palo Duro Canyon and is not likely to be exposed to the LCRA TSC Activities.
136.	*Corynorhinus rafinesquii*	Rafinesque's big-eared bat	No	3	1	0	0	2	1	0		2	Species is not federally listed and is not known to be affected by white-nose syndrome. Future listing seems unlikely.
137.	*Canis rufus*	Red wolf	No	0	0	0	0	0	0	0		0	Species is extirpated from Texas.
138.	*Lasiurus ega*	Southern yellow bat	No	3	1	0	0	2	1	0		2	Species is not federally listed and is not known to be affected by white-nose syndrome. Future listing seems unlikely.
139.	*Euderma maculatum*	Spotted bat	No	1	1	0	0	1	1	0		1	Species is not federally listed and is not known to be affected by white-nose syndrome. Future listing seems unlikely. Species occurs in remote habitat and is unlikely to be exposed to impacts from LCRA TSC Activities.
140.	*Dipodomys elator*	Texas kangaroo rat	No	3	1	2	2	1	0	0	X	2	Species is petitioned for federal listing with a positive 90-day finding. However, likelihood of actual listing is uncertain at this time. LCRA TSC Activities are unlikely to occur in the near future in areas within the range of the species.
141.	*Perimyotis subflavus*	Tri-colored bat	No	2	1	0	0	1	1	0	X	1	Species is petitioned for federal listing and is significantly affected in parts of its range by white-nose syndrome. However, the likelihood of actual listing is uncertain at this time. Species likely roosts in trees during active periods but hibernates in caves. Vegetation clearing could cause minor loss of habitat, but direct impacts to bats could be avoided through seasonal restrictions on clearing. Likely to be exposed to impacts from LCRA TSC Activities.
142.	*Trichechus manatus*	West Indian manatee	No	0	0	0	0	1	1	1		1	Species is federally listed but unlikely to be exposed to LCRA TSC Activities.
143.	*Nasua narica*	White-nosed coati	No	2	1	0	0	0	0	0		1	Species is not federally listed and future listing seems unlikely due to the species' wide range and potentially abundant numbers outside of Texas. Species is unlikely to be exposed to LCRA TSC Activities.
144.	*Pseudotryonia adamantina*	Diamond tryonia	No	1	1	1	1	0	0	1	X	1	Species is federally listed but occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
145.	*Fusconaia (syn. Quincuncina) mitchelli*	False spike	No	1	0	1	0	0	0	0	X	1	Species is petitioned for federal listing with a positive 90-day finding. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
146.	*Radiocentrum ferrissi*	Fringed mountainsnail	No	0	0	0	0	0	0	0		0	Species is only known from Texas from fossil record from Franklin Mountains (El Paso County).
147.	*Quadrula aurea*	Golden orb	No	1	0	1	0	0	0	0	X	1	Species is a candidate for federal listing. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
148.	*Tryonia circumstriata*	Gonzales tryonia	No	1	1	1	1	0	0	1	X	1	Species is federally listed but occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.

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149.	*Pleurobema riddellii*	Louisiana pigtoe	No	1	0	1	0	0	0	0	X	1	Species is petitioned for federal listing with a positive 90-day finding. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
150.	*Truncilla cognata*	Mexican fawnsfoot	No	1	0	1	0	0	0	0	X	1	Species is petitioned for federal listing with a positive 90-day finding. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
151.	*Phreatodrobia imitata*	Mimic cavesnail	No	1	1	1	1	0	0	1	X	1	Species is petitioned for federal listing with a positive 90-day finding. Species occurs in deep aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid impacts to water quality.
152.	*Arkansia wheeleri*	Ouachita rock pocketbook	No	1	1	1	1	0	0	1	X	1	Species is federally listed but occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
153.	*Assiminea pecos*	Pecos assiminea snail	No	1	1	1	0	1	0	1	X	1	Species is federally listed but occurs in a highly restricted range not expected to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
154.	*Pyrgulopsis texana*	Phantom Cave springsnail	No	1	1	1	1	0	0	1	X	1	Species is federally listed but occurs in a highly restricted range not expected to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
155.	*Tryonia cheatumi*	Phantom tryonia	No	1	1	1	1	0	0	1	X	1	Species is federally listed but occurs in a highly restricted range not expected to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
156.	*Potamilus metnecktayi*	Salina mucket	No	1	0	1	0	0	0	1	X	1	Species is petitioned for federal listing. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
157.	*Lampsilis satura*	Sandbank pocketbook	No	0	0	1	0	0	0	0	X	1	Species is not federally listed and future listing is unlikely due to relatively robust population size and distribution. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
158.	*Quadrula houstonensis*	Smooth pimpleback	No	1	0	1	0	0	0	0	X	1	Species is a candidate for federal listing. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
159.	*Obovaria jacksoniana*	Southern hickorynut	No	0	0	1	0	0	0	0	X	1	Species is not federally listed but is highly rare. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
160.	*Lampsilis bracteata*	Texas fatmucket	No	1	0	1	0	0	0	0	X	1	Species is a candidate for federal listing. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
161.	*Truncilla macrodon*	Texas fawnsfoot	No	1	0	1	0	0	0	0	X	1	Species is a candidate for federal listing. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
162.	*Potamilus amphichaenus*	Texas heelsplitter	No	1	0	1	0	0	0	0	X	1	Species is petitioned for federal listing. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
163.	*Popenaias popeii*	Texas hornshell	No	1	0	1	0	0	0	0	X	1	Species is proposed for federal listing as endangered. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
164.	*Fusconaia askewi*	Texas pigtoe	No	0	0	1	0	0	0	0	X	1	Species is not federally listed and future listing is unlikely due to relatively robust population size and distribution. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
165.	*Quadrula petrina*	Texas pimpleback	No	1	0	1	0	0	0	0	X	1	Species is a candidate for federal listing. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
166.	*Fusconaia lananensis*	Triangle pigtoe	No	1	0	1	0	0	0	0	X	1	Species is petitioned for federal listing with a positive 90-day finding. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
167.	*Thymophylla tephroleuca*	Ashy dogweed	No	3	2	3	0	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.

Ref. No.	Scientific Name	Common Name	HCP Covered Species ?	Vegetation Clearing[1]	Vegetation Maintenance	Soil Disturbance / Surface grading	Excavation	Nuisance (noise/light/ activity)	Collision/ Avoidance	Fill (aquatic habitats)	Consider Measures for Avoidance or Minimization	Overall Assessment (Exposure and Effects)	Notes and Discussion
168.	*Salvia pentstemonoides*	Big red sage	No	3	3	3	1	0	0	0	X	2	This species is under review for potential future listing. LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
169.	*Echinocereus reichenbachii var albertii*	Black lace cactus	No	3	2	2	0	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
170.	*Streptanthus bracteatus*	Bracted twistflower	No	3	2	3	1	0	0	0	X	2	Candidate species for federal listing and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
171.	*Genistidium dumosum*	Brush-pea	No	2	1	3	1	0	0	0	X	2	This species is under review for potential future listing. LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
172.	*Coryphantha ramillosa*	Bunched Cory cactus	No	2	2	3	0	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
173.	*Paronychia congesta*	Bushy whitlowwort	No	2	1	3	1	0	0	0	X	2	This species is under review for potential future listing. LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
174.	*Pediomelum pentaphyllum*	Chihuahua scurfpea	No	1	0	1	0	0	0	0		0	This species is under review for potential future listing, but has not been sighted in Texas since 1871. LCRA TSC Activities are unlikely to affect the species due to avoidance.
175.	*Hexalectris revoluta*	Chisos coralroot	No	1	0	0	0	0	0	0		0	This species is under review for potential future listing, but occurs at mid to high elevations in the Chisos and Guadalupe Mountains. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
176.	*Echinocereus chisoensis var chisoensis*	Chisos Mountains hedgehog cactus	No	2	1	2	2	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
177.	*Physostegia correllii*	Correll's false dragon-head	No	1	2	1	1	0	0	1	X	1	Species is under review for federal listing, but occurs in association with wetlands habitats where LCRA TSC Activities are likely to avoid creating subsurface disturbances. LCRA TSC Activities are unlikely to affect this species due to lack of exposure.
178.	*Cyperus cephalanthus*	Cryptic flatsedge	No	1	1	1	1	0	0	0		1	No federal status and 90-day “not substantial” finding.
179.	*Echinocereus davisii*	Davis' green pitaya	No	1	1	1	0	0	0	0	X	1	Species is federally listed and is restricted to steep, Caballos novaculite outcrops in Brewster County. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
180.	*Donrichardsia macroneuron*	Don Richard’s spring moss	No	1	1	1	1	0	0	1	X	1	Species is under review for federal listing, but is known from only one location at a spring outlet. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
181.	*Geocarpon minimum*	Earth fruit (Tinytim)	No	1	1	2	0	0	0	0	X	1	Species is federally listed and restricted to four Texas localities. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
182.	*Festuca ligulata*	Guadalupe fescue	No	0	0	0	0	0	0	0		0	Species is proposed for federal listing and exists at one Texas locality between 1,800 to 2,000 meters in the Chisos Mountains. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
183.	*Schoenoplectus hallii*	Hall's bulrush	No	3	2	3	1	0	0	3	X	2	This species is under review for potential future listing. LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
184.	*Fissidens hallii*	Hall's pocket moss	No	3	1	3	1	0	0	2	X	2	This species is under review for potential future listing. LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
185.	*Quercus hinckleyi*	Hinckley's oak	No	2	2	3	0	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
186.	*Frankenia johnstonii*	Johnston's frankenia	No	3	3	3	1	0	0	0		2	Delisted species.

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187.	*Abronia macrocarpa*	Large-fruited sand-verbena	No	2	1	2	0	0	0	0	X	1	Species is federally listed, and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
188.	*Agalinis calycina*	Leoncita false-foxglove	No	1	1	1	0	0	0	0		1	Species is under review for federal listing, but occurs in wetland habitats on protected lands. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
189.	*Potamogeton clystocarpus*	Little Aguja pondweed	No	1	1	1	0	0	0	2		1	Species is federally listed with one known Texas locality in aquatic habitat. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
190.	*Sclerocactus mariposensis*	Lloyd's mariposa cactus	No	1	1	1	0	0	0	0	X	1	Species is federally listed, and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
191.	*Agalinis navasotensis*	Navasota false foxglove	No	3	3	3	1	0	0	0	X	2	This species is under review for potential future listing. LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
192.	*Spiranthes parksii*	Navasota ladies' tresses	No	3	3	3	2	0	0	0	X	2	Species is federally listed, and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
193.	*Hibiscus dasycalyx*	Neches River rose-mallow	No	2	1	2	0	0	0	3	X	1	Species is federally listed, and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
194.	*Escobaria (syn. Coryphantha) minima*	Nellie Cory cactus	No	1	1	1	0	0	0	0	X	1	Species is federally listed and is restricted to steep, Caballos novaculite outcrops in Brewster County. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
195.	*Helianthus paradoxus*	Pecos/Puzzle sunflower	No	1	1	1	0	0	0	0	X	1	Species is federally listed and is restricted in Texas to two populations within rare wetlands called, ciénegas. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
196.	*Asclepias prostrata*	Prostrate milkweed	No	2	1	3	1	0	0	0	X	2	This species is under review for potential future listing. LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
197.	*Symphyotrichum puniceum var. scabricaule*	Rough-stemmed aster	No	2	1	2	1	0	0	3	X	1	Species is under review for federal listing, but occurs in wetland habitats. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
198.	*Helianthus occidentalis* ssp. *plantagineus*	Shinner's sunflower	No	3	3	3	2	0	0	0	X	2	This species is under review for potential future listing. LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
199.	*Hoffmannseggia tenella*	Slender rushpea	No	3	2	2	0	0	0	0	X	2	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
200.	*Eriocaulon koernickianum*	Small-headed pipewort	No	1	1	1	2	0	0	3	X	1	Species is under review for federal listing, but occurs in wetland habitats. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
201.	*Ambrosia cheiranthifolia*	South Texas ambrosia	No	3	2	3	0	0	0	0	X	2	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
202.	*Astrophytum asterias*	Star cactus	No	2	1	2	1	0	0	0	X	2	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
203.	*Cryptantha crassipes*	Terlingua Creek cat's-eye	No	1	1	2	0	0	0	0	X	1	Species is federally listed and known from ten sites of the Boquillas Formation (Trans-Pecos shrub savanna) in Brewster County. LCRA TSC Activities are unlikely to affect the species due to avoidance.
204.	*Ayenia limitaris*	Texas ayenia	No	3	1	3	0	0	0	0	X	2	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.

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Ref. No.	Scientific Name	Common Name	HCP Covered Species ?	Vegetation Clearing[1]	Vegetation Maintenance	Soil Disturbance / Surface grading	Excavation	Nuisance (noise/light/ activity)	Collision/ Avoidance	Fill (aquatic habitats)	Consider Measures for Avoidance or Minimization	Overall Assessment (Exposure and Effects)	Notes and Discussion
205.	*Leavenworthia texana*	Texas golden gladecress	No	1	1	1	0	0	0	1	X	1	Species is federally listed and known from few sites within Plan Area in wetland habitats. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
206.	*Callirhoe scabriuscula*	Texas poppy-mallow	No	2	2	3	0	0	0	0	X	2	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
207.	*Hymenoxys texana*	Texas prairie dawn	No	2	2	3	0	0	0	0	X	2	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
208.	*Bartonia texana*	Texas screwstem	No	1	1	1	1	0	0	1	X	1	Species is under review for federal listing, but occurs in wetland habitats. LCRA TSC Activities are unlikely to affect the species due to lack of exposure.
209.	*Styrax texanus (Syn. Styrax platanifolius ssp texanus)*	Texas snowbells	No	2	2	2	0	0	0	0	X	2	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
210.	*Phlox nivalis ssp texensis*	Texas trailing phlox	No	2	1	3	1	0	0	0	X	2	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
211.	*Trillium texanum*	Texas trillium	No	3	1	2	1	0	0	3	X	1	This species is under review for potential future listing. LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
212.	*Zizania texana*	Texas wild rice	No	1	1	1	0	0	0	0	X	1	Species is federally listed and known from only the upper reach of San Marcos River. LCRA TSC Activities generally avoid disturbing aquatic habitats and are unlikely to affect the species due to lack of exposure.
213.	*Amsonia tharpii*	Tharp's blue-star	No	2	1	3	1	0	0	0	X	2	This species is under review for potential future listing. LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
214.	*Sclerocactus brevihamatus ssp. tobuschii*	Tobusch fishhook cactus	No	3	1	3	2	0	0	0	X	3	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
215.	*Manihot walkerae*	Walker's manioc	No	3	2	2	0	0	0	0	X	2	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
216.	*Physaria pallida*	White bladderpod	No	3	2	2	0	0	0	0	X	2	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
217.	*Physaria thamnophila*	Zapata bladderpod	No	3	2	2	0	0	0	0	X	2	Species is federally listed and LCRA TSC Activities could affect habitat. Individuals of this species could be destroyed by vegetation clearing, construction, or vegetation maintenance.
218.	*Macrochelys temminckii*	Alligator snapping turtle	No	1	1	1	0	0	0	0	X	1	Species is petitioned for federal listing with Critical Habitat with a positive 90-day finding. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
219.	*Eretmochelys imbricata*	Atlantic hawksbill sea turtle	No	0	0	0	0	1	1	0	X	1	Species is federally listed but occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
220.	*Coniophanes imperialis*	Black-striped snake	No	3	1	2	2	1	1	2	X	2	Species is not federally listed. Species is restricted to the southern tip of Texas, but is a fairly common across its range. Vegetation clearing, maintenance, and surface impacts could disturb habitat. Consider measures to minimize risk of collisions.
221.	*Nerodia harteri*	Brazos water snake	No	2	1	1	1	0	0	0	X	1	Species is not federally listed and does not occur in areas where activities are expected to occur in the immediate future. Species is mostly aquatic and can be found on banks and shorelines, which could be affected by vegetation clearing or maintenance. Consider measures to avoid aquatic habitats.
222.	*Graptemys caglei*	Cagle's map turtle	No	2	1	1	0	1	0	0	X	1	Species is not federally listed. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.

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Ref. No.	Scientific Name	Common Name	HCP Covered Species ?	Vegetation Clearing[1]	Vegetation Maintenance	Soil Disturbance / Surface grading	Excavation	Nuisance (noise/light/ activity)	Collision/ Avoidance	Fill (aquatic habitats)	Consider Measures for Avoidance or Minimization	Overall Assessment (Exposure and Effects)	Notes and Discussion
223.	*Trimorphodon vilkinsonii*	Chihuahuan Desert lyre snake	No	1	1	2	0	1	0	0	X	1	Species is not federally listed and future listing seems unlikely due to the species' wide range and abundant population. Consider measures to minimize risk of collisions.
224.	*Kinosternon hirtipes murrayi*	Chihuahuan mud turtle	No	1	0	1	0	0	0	0	X	1	Species is not federally listed. Species has a highly restricted range, occurring in one creek in the Big Bend region. Species is not likely to conflict with LCRA TSC Activities, but measures to avoid impacts could be emplaced if needed.
225.	*Nerodia paucimaculata*	Concho water snake	No	2	1	1	1	0	0	0	X	1	Species has been delisted; however, it is present in areas that may be impacted in the immediate future. Mostly aquatic, the species can be found on banks and shorelines, which could be affected by vegetation clearing or maintenance. Consider measures to avoid aquatic habitats.
226.	*Sceloporus grenicolus*	Dunes sagebrush lizard	No	1	1	3	3	1	1	0	X	2	Species is petitioned for listing, but the likelihood of actual listing is too uncertain and the Texas Conservation Plan may provide an avenue for ESA compliance if listed. Vegetation clearing, maintenance, and surface impacts could disturb habitat. Range is in a region where LCRA TSC Activities are unlikely to occur in the near future.
227.	*Chelonia mydas*	Green sea turtle	No	0	0	0	0	2	1	0	X	1	Species is federally listed but occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Species comes ashore only to nest, and is known to nest in Texas only on South Padre Island. Consider measures to avoid nesting habitats.
228.	*Lepidochelys kempii*	Kemp's ridley sea turtle	No	0	0	0	0	2	0	0	X	1	Species is federally listed and is petitioned for Critical Habitat. Species occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. This species comes to shore only to nest, and most but not all nesting in Texas occurs on Padre Island National Seashore. Consider measures to avoid nesting habitats.
229.	*Dermochelys coriacea*	Leatherback sea turtle	No	0	0	0	0	1	1	0	X	1	Species is federally listed but occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Species has very few nesting records, with all from Padre Island, thus activities are not likely to impact. Consider measures to avoid nesting habitats.
230.	*Caretta caretta*	Loggerhead sea turtle	No	0	0	0	0	2	1	0	X	1	Species is federally listed but occurs in aquatic habitats that are unlikely to be impacted by the LCRA TSC Activities. Species comes ashore only to nest. Although a rare nester in the state, potential exists for nesting to occur along full length of Texas coast. Consider measures to avoid nesting habitats.
231.	*Pituophis ruthveni*	Louisiana pine snake	No	3	1	2	1	1	1	0		2	Species known distribution in the Plan Area is limited to one population on federal lands. Species could be disturbed by clearing or maintenance in longleaf pine forests, although this species does not occur in portions of the state where LCRA TSC Activities are likely to occur in the near future.
232.	*Phrynosoma hernandesi*	Mountain short-horned lizard	No	0	0	0	0	0	0	0		0	Species is not federally listed. Species occurs in higher elevations of mountain ranges, not in areas where LCRA TSC Activities are expected to occur in the immediate future.
233.	*Leptodeira septentrionalis septentrionalis*	Northern cat-eyed snake	No	3	1	2	1	1	1	2	X	2	Species is not federally listed and future listing seems unlikely given its broad overall range and estimated abundance. Species has a very restricted range in Texas. Consider measures to minimize risk of collisions.
234.	*Cemophora coccinea copei*	Northern scarlet snake	No	1	1	3	3	1	0	0		2	Species is not federally listed and future listing seems unlikely due to relatively robust population size. This species does not occur in areas where LCRA TSC Activities are expected to occur in the immediate future.
235.	*Crotaphytus reticulatus*	Reticulate collared lizard	No	1	1	3	3	1	1	0		2	Species is not federally listed. Vegetation clearing, maintenance, and surface impacts could disturb habitat; direct impacts are possible if grading occurred during cold-weather periods. Species' range is in a region where activities are likely to occur in the future. Consider measures to minimize risk of collisions.
236.	*Coleonyx reticulatus*	Reticulated gecko	No	1	0	2	0	0	0	0		1	Species is not federally listed. Species occurs only in remote and rugged areas of Trans Pecos unlikely to be affected by LCRA TSC Activities.
237.	*Pseudemys gorzugi*	Rio Grande cooter	No	1	1	1	0	1	1	0	X	1	Species is not federally listed. Species occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.
238.	*Liochlorophis vernalis*	Smooth green snake	No	1	1	3	2	1	0	1	X	1	Species is not federally listed. Species occurs in coastal prairie habitat and outside of areas where LCRA TSC Activities are expected to occur in the near future. Future listing seems unlikely.
239.	*Drymobius margaritiferus*	Speckled racer	No	2	1	2	1	1	1	1	X	1	Species is not federally listed. Species may be restricted in occurrence to state parks and national wildlife refuges, where LCRA TSC Activities will not occur.

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240.	*Holbrookia lacerata*	Spot-tailed earless lizard	Yes	1	1	3	3	1	1	0	X	2	Species is petitioned for listing with Critical Habitat with 90-Day Substantial petition finding. Vegetation clearing, maintenance, and surface impacts could disturb habitat; direct impacts are possible if grading occurred during cold-weather periods. Range is in a region where LCRA TSC Activities are likely to occur in the future.
241.	*Phrynosoma cornutum*	Texas horned lizard	No	2	2	2	1	1	2	0	X	2	Species is not federally listed. Species occurs across much of south and west Texas where activities are likely to occur in the immediate future. This species continues to be abundant range-wide and listing seems unlikely. Consider measures to minimize risk of collisions.
242.	*Drymarchon melanurus erebennus*	Texas indigo snake	No	3	1	3	3	1	1	2	X	2	Species is not federally listed. Species occurs across south Texas south of the Edwards Plateau and Guadalupe River. Consider measures to minimize risk of collisions.
243.	*Cemophora coccinea lineri*	Texas scarlet snake	No	1	1	3	3	1	1	0	X	3	Species is not federally listed. Species' range is in the existing infrastructure and the projected future growth areas associated with the Texas lower Gulf Coast. Direct impacts to species might be able to be avoided with pre-construction surveys.
244.	*Gopherus berlandieri*	Texas tortoise	No	2	2	2	1	1	2	0	X	2	Species is not federally listed. Species occurs across much of south Texas where activities are likely to occur in the immediate future. Federal listing seems unlikely.
245.	*Crotalus horridus*	Timber rattlesnake	No	3	1	3	2	1	2	1	X	3	Species is not federally listed. Species occurs in portions of the state where activities are likely to occur in the near future. Federal listing seems unlikely due to wide distribution and abundance. Consider measures to minimize risk of collisions.
246.	*Tantilla cucullata*	Trans-Pecos black-headed snake	No	1	1	2	0	1	0	0	X	2	Species is not federally listed. Species occurs in rugged terrain of Trans Pecos east to Del Rio; vegetation clearing would have little effect on its desert habitat. There is some chance of disturbing a snake through construction of transmission line structures.
247.	*Deirochelys reticularia miaria*	Western chicken turtle	No	1	1	1	0	1	1	0	X	1	Species is not federally listed. Species occurs in aquatic habitats unlikely to be impacted by the LCRA TSC Activities. Consider measures to avoid aquatic habitats.

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APPENDIX C

County-Level Estimates of Disturbances from LCRA TSC Activities

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Appendix C -- County-Level Estimates of Disturbances from LCRA TSC Activities

July 5, 2019

County Name	Activity Zone	Zone Representation within Plan Area	Total Acres Surface Disturbance - PM	Surface Disturbance - PUM	Subsurface Disturbance - PM	Subsurface Disturbance PUM
Anderson	Other Counties	1.27%	494.10	94.53	85.19	14.50
Andrews	Adjoining	2.13%	965.92	185.99	166.24	28.56
Angelina	Other Counties	1.27%	494.10	94.53	85.19	14.50
Aransas	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Archer	Other Counties	1.27%	494.10	94.53	85.19	14.50
Armstrong	Other Counties	1.27%	494.10	94.53	85.19	14.50
Atascosa	Adjoining	2.13%	965.92	185.99	166.24	28.56
Austin	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Bandera	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Bastrop	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Baylor	Other Counties	1.27%	494.10	94.53	85.19	14.50
Bee	Adjoining	2.13%	965.92	185.99	166.24	28.56
Bell	Adjoining	2.13%	965.92	185.99	166.24	28.56
Bexar	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Blanco	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Borden	Adjoining	2.13%	965.92	185.99	166.24	28.56
Bosque	Adjoining	2.13%	965.92	185.99	166.24	28.56
Bowie	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Brazoria	Adjoining	2.13%	965.92	185.99	166.24	28.56
Brazos	Future Growth	33.33%	965.92	185.99	166.24	28.56
Brewster	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Briscoe	Other Counties	1.27%	494.10	94.53	85.19	14.50
Brooks	Adjoining	2.13%	965.92	185.99	166.24	28.56
Brown	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Burleson	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Burnet	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Caldwell	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Calhoun	Adjoining	2.13%	965.92	185.99	166.24	28.56
Callahan	Adjoining	2.13%	965.92	185.99	166.24	28.56
Cameron	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Camp	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Carson	Other Counties	1.27%	494.10	94.53	85.19	14.50
Castro	Other Counties	1.27%	494.10	94.53	85.19	14.50
Chambers	Adjoining	2.13%	965.92	185.99	166.24	28.56
Cherokee	Other Counties	1.27%	494.10	94.53	85.19	14.50
Childress	Other Counties	1.27%	494.10	94.53	85.19	14.50
Clay	Other Counties	1.27%	494.10	94.53	85.19	14.50
Coke	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Coleman	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Collin	Other Counties	1.27%	494.10	94.53	85.19	14.50
Collingsworth	Other Counties	1.27%	494.10	94.53	85.19	14.50
Colorado	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Comal	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28

Note: PM = Previously Modified; PUM = Previously Unmodified

Appendix C -- County-Level Estimates of Disturbances from LCRA TSC Activities

County Name	Activity Zone	Zone Representation within Plan Area	Total Acres Surface Disturbance - PM	Surface Disturbance - PUM	Subsurface Disturbance - PM	Subsurface Disturbance PUM
Comanche	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Concho	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Cooke	Other Counties	1.27%	494.10	94.53	85.19	14.50
Coryell	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Cottle	Other Counties	1.27%	494.10	94.53	85.19	14.50
Crane	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Crockett	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Crosby	Other Counties	1.27%	494.10	94.53	85.19	14.50
Culberson	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Dallas	Other Counties	1.27%	494.10	94.53	85.19	14.50
Dawson	Other Counties	1.27%	494.10	94.53	85.19	14.50
De Witt	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Deaf Smith	Other Counties	1.27%	494.10	94.53	85.19	14.50
Delta	Other Counties	1.27%	494.10	94.53	85.19	14.50
Denton	Other Counties	1.27%	494.10	94.53	85.19	14.50
Dickens	Other Counties	1.27%	494.10	94.53	85.19	14.50
Dimmit	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Donley	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Duval	Other Counties	1.27%	494.10	94.53	85.19	14.50
Eastland	Adjoining	2.13%	965.92	185.99	166.24	28.56
Ector	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Edwards	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Ellis	Other Counties	1.27%	494.10	94.53	85.19	14.50
Erath	Adjoining	2.13%	965.92	185.99	166.24	28.56
Falls	Adjoining	2.13%	965.92	185.99	166.24	28.56
Fannin	Other Counties	1.27%	494.10	94.53	85.19	14.50
Fayette	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Fisher	Adjoining	2.13%	965.92	185.99	166.24	28.56
Floyd	Other Counties	1.27%	494.10	94.53	85.19	14.50
Foard	Other Counties	1.27%	494.10	94.53	85.19	14.50
Fort Bend	Adjoining	2.13%	965.92	185.99	166.24	28.56
Franklin	Other Counties	1.27%	494.10	94.53	85.19	14.50
Freestone	Other Counties	1.27%	494.10	94.53	85.19	14.50
Frio	Adjoining	2.13%	965.92	185.99	166.24	28.56
Gaines	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Galveston	Adjoining	2.13%	965.92	185.99	166.24	28.56
Garza	Adjoining	2.13%	965.92	185.99	166.24	28.56
Gillespie	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Glasscock	Adjoining	2.13%	965.92	185.99	166.24	28.56
Goliad	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Gonzales	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Gray	Other Counties	1.27%	494.10	94.53	85.19	14.50
Grayson	Other Counties	1.27%	494.10	94.53	85.19	14.50

Note: PM = Previously Modified; PUM = Previously Unmodified

Appendix C -- County-Level Estimates of Disturbances from LCRA TSC Activities

County Name	Activity Zone	Zone Representation within Plan Area	Total Acres Surface Disturbance - PM	Surface Disturbance - PUM	Subsurface Disturbance - PM	Subsurface Disturbance PUM
Gregg	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Grimes	Adjoining	2.13%	965.92	185.99	166.24	28.56
Guadalupe	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Hale	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Hall	Other Counties	1.27%	494.10	94.53	85.19	14.50
Hamilton	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Hansford	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Hardeman	Other Counties	1.27%	494.10	94.53	85.19	14.50
Harris	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Harrison	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Hartley	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Haskell	Other Counties	1.27%	494.10	94.53	85.19	14.50
Hays	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Hemphill	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Henderson	Other Counties	1.27%	494.10	94.53	85.19	14.50
Hidalgo	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Hill	Other Counties	1.27%	494.10	94.53	85.19	14.50
Hood	Other Counties	1.27%	494.10	94.53	85.19	14.50
Hopkins	Other Counties	1.27%	494.10	94.53	85.19	14.50
Houston	Other Counties	1.27%	494.10	94.53	85.19	14.50
Howard	Adjoining	2.13%	965.92	185.99	166.24	28.56
Hudspeth	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Hunt	Other Counties	1.27%	494.10	94.53	85.19	14.50
Hutchinson	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Irion	Adjoining	2.13%	965.92	185.99	166.24	28.56
Jack	Other Counties	1.27%	494.10	94.53	85.19	14.50
Jackson	Adjoining	2.13%	965.92	185.99	166.24	28.56
Jasper	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Jeff Davis	Adjoining	2.13%	965.92	185.99	166.24	28.56
Jefferson	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Jim Hogg	Adjoining	2.13%	965.92	185.99	166.24	28.56
Jim Wells	Adjoining	2.13%	965.92	185.99	166.24	28.56
Johnson	Other Counties	1.27%	494.10	94.53	85.19	14.50
Jones	Adjoining	2.13%	965.92	185.99	166.24	28.56
Karnes	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Kaufman	Other Counties	1.27%	494.10	94.53	85.19	14.50
Kendall	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Kenedy	Adjoining	2.13%	965.92	185.99	166.24	28.56
Kent	Adjoining	2.13%	965.92	185.99	166.24	28.56
Kerr	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Kimble	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
King	Other Counties	1.27%	494.10	94.53	85.19	14.50
Kinney	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28

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Appendix C -- County-Level Estimates of Disturbances from LCRA TSC Activities

County Name	Activity Zone	Zone Representation within Plan Area	Total Acres Surface Disturbance - PM	Surface Disturbance - PUM	Subsurface Disturbance - PM	Subsurface Disturbance PUM
Kleberg	Adjoining	2.13%	965.92	185.99	166.24	28.56
Knox	Other Counties	1.27%	494.10	94.53	85.19	14.50
La Salle	Adjoining	2.13%	965.92	185.99	166.24	28.56
Lamar	Other Counties	1.27%	494.10	94.53	85.19	14.50
Lamb	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Lampasas	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Lavaca	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Lee	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Leon	Other Counties	1.27%	494.10	94.53	85.19	14.50
Liberty	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Limestone	Other Counties	1.27%	494.10	94.53	85.19	14.50
Lipscomb	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Live Oak	Adjoining	2.13%	965.92	185.99	166.24	28.56
Llano	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Loving	Adjoining	2.13%	965.92	185.99	166.24	28.56
Lubbock	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Lynn	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Madison	Adjoining	2.13%	965.92	185.99	166.24	28.56
Martin	Adjoining	2.13%	965.92	185.99	166.24	28.56
Mason	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Matagorda	Adjoining	2.13%	965.92	185.99	166.24	28.56
Maverick	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Mcculloch	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Mclennan	Adjoining	2.13%	965.92	185.99	166.24	28.56
Mcmullen	Other Counties	1.27%	494.10	94.53	85.19	14.50
Medina	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Menard	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Midland	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Milam	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Mills	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Mitchell	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Montague	Other Counties	1.27%	494.10	94.53	85.19	14.50
Montgomery	Adjoining	2.13%	965.92	185.99	166.24	28.56
Moore	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Morris	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Motley	Other Counties	1.27%	494.10	94.53	85.19	14.50
Nacogdoches	Other Counties	1.27%	494.10	94.53	85.19	14.50
Navarro	Other Counties	1.27%	494.10	94.53	85.19	14.50
Nolan	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Nueces	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Ochiltree	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Oldham	Other Counties	1.27%	494.10	94.53	85.19	14.50
Palo Pinto	Other Counties	1.27%	494.10	94.53	85.19	14.50

Note: PM = Previously Modified; PUM = Previously Unmodified

Appendix C -- County-Level Estimates of Disturbances from LCRA TSC Activities

County Name	Activity Zone	Zone Representation within Plan Area	Total Acres Surface Disturbance - PM	Surface Disturbance - PUM	Subsurface Disturbance - PM	Subsurface Disturbance PUM
Panola	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Parker	Other Counties	1.27%	494.10	94.53	85.19	14.50
Parmer	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Pecos	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Polk	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Potter	Other Counties	1.27%	494.10	94.53	85.19	14.50
Presidio	Adjoining	2.13%	965.92	185.99	166.24	28.56
Rains	Other Counties	1.27%	494.10	94.53	85.19	14.50
Randall	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Reagan	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Real	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Red River	Other Counties	1.27%	494.10	94.53	85.19	14.50
Reeves	Future Growth	33.33%	965.92	185.99	166.24	28.56
Refugio	Adjoining	2.13%	965.92	185.99	166.24	28.56
Roberts	Other Counties	1.27%	494.10	94.53	85.19	14.50
Robertson	Adjoining	2.13%	965.92	185.99	166.24	28.56
Rockwall	Other Counties	1.27%	494.10	94.53	85.19	14.50
Runnels	Adjoining	2.13%	965.92	185.99	166.24	28.56
Rusk	Other Counties	1.27%	494.10	94.53	85.19	14.50
San Augustine	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
San Jacinto	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
San Patricio	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
San Saba	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Schleicher	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Scurry	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Shackelford	Other Counties	1.27%	494.10	94.53	85.19	14.50
Shelby	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Smith	Other Counties	1.27%	494.10	94.53	85.19	14.50
Somervell	Other Counties	1.27%	494.10	94.53	85.19	14.50
Starr	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Stephens	Other Counties	1.27%	494.10	94.53	85.19	14.50
Sterling	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Stonewall	Other Counties	1.27%	494.10	94.53	85.19	14.50
Sutton	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Swisher	Other Counties	1.27%	494.10	94.53	85.19	14.50
Tarrant	Other Counties	1.27%	494.10	94.53	85.19	14.50
Taylor	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Terrell	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Terry	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Throckmorton	Other Counties	1.27%	494.10	94.53	85.19	14.50
Titus	Other Counties	1.27%	494.10	94.53	85.19	14.50
Tom Green	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Travis	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28

Note: PM = Previously Modified; PUM = Previously Unmodified

Appendix C -- County-Level Estimates of Disturbances from LCRA TSC Activities

County Name	Activity Zone	Zone Representation within Plan Area	Total Acres Surface Disturbance - PM	Surface Disturbance - PUM	Subsurface Disturbance - PM	Subsurface Disturbance PUM
Trinity	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Tyler	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Upshur	Outside ERCOT	3.03%	50.29	9.68	8.66	1.49
Upton	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Uvalde	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Val Verde	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Van Zandt	Other Counties	1.27%	494.10	94.53	85.19	14.50
Victoria	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Walker	Other Counties	1.27%	494.10	94.53	85.19	14.50
Waller	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Ward	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Washington	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Webb	Adjoining	2.13%	965.92	185.99	166.24	28.56
Wharton	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Wheeler	Other Counties	1.27%	494.10	94.53	85.19	14.50
Wichita	Other Counties	1.27%	494.10	94.53	85.19	14.50
Wilbarger	Other Counties	1.27%	494.10	94.53	85.19	14.50
Willacy	Adjoining	2.13%	965.92	185.99	166.24	28.56
Williamson	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Wilson	Existing Facilities	1.27%	1085.56	215.90	185.13	33.28
Winkler	Adjoining	2.13%	965.92	185.99	166.24	28.56
Wise	Other Counties	1.27%	494.10	94.53	85.19	14.50
Wood	Other Counties	1.27%	494.10	94.53	85.19	14.50
Young	Other Counties	1.27%	494.10	94.53	85.19	14.50
Zapata	Adjoining	2.13%	965.92	185.99	166.24	28.56
Zavala	Future Growth	33.33%	965.92	185.99	166.24	28.56

Note: PM = Previously Modified; PUM = Previously Unmodified

APPENDIX D

Background, Analysis, and Conservation Measures for Covered Species

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PREFACE

The following pages provide information about each Covered Species (or group of similar Covered Species) that is relevant to the assessment of incidental take and the implementation of the Conservation Program for Covered Activities, as specified in the LCRA TSC Transmission System HCP.[1] This information includes:

1. Ecology, range or distribution, phenology, potential habitat availability, and population size;
2. Potential effects of the Covered Activities;
3. Application of the tests for using habitat modification as a surrogate metric for incidental take; and
4. Application of the Conservation Program to Covered Activities, including:
    a. Methods for delineating Suitable Habitat;
    b. Methods for performing Presence/Absence Surveys and how to apply the results of Presence/Absence Surveys to the delineation of Occupied Habitat;
    c. Methods for identifying and delineating the extent of Existing Impacts and Special Cases
    d. Optional Avoidance Measures that can avoid entirely or minimize the amount of incidental take;
    e. Specific Minimization Measures that reduce the impact of incidental take;
    f. Methods for delineating the extent of Direct Habitat Modifications and Indirect Habitat Modifications that together are the surrogate metric for measuring incidental take;
    g. A matrix for assessing the amount of compensatory mitigation under certain Enrollment Scenarios and Mitigation Factors; and
    h. Anticipated forms and priorities for Mitigation actions.

The LCRA TSC Transmission System HCP includes additional context for the content provided herein. References cited in the treatment for each Covered Species appear at the end of this appendix.

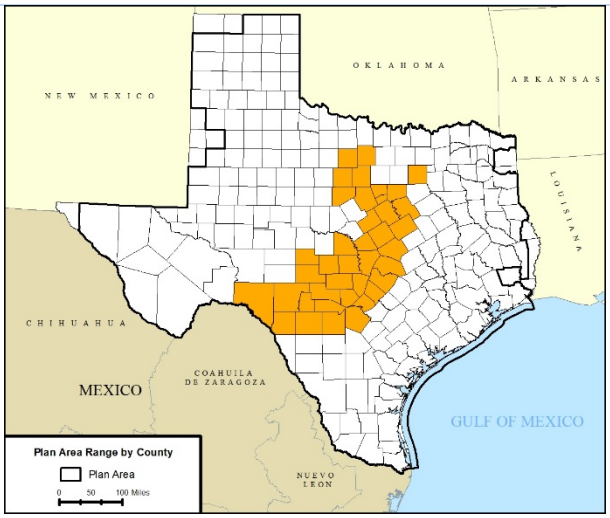
[1] Capitalized terms and abbreviations not defined herein are defined in the Glossary to the LCRA Transmission Services Corporation Transmission System Habitat Conservation Plan.

Golden-cheeked Warbler

Setophaga chrysoparia (GCWA)

Ecology

- Migratory songbird, with breeding range occurring entirely inside Plan Area
- GCWA arrive in Texas in early March and leaves for wintering grounds in Mexico to Nicaragua (or rarely to Costa Rica) by late July or mid-August (breeding season typically approximated as March 15 through July 31)
- Breeding GCWA are territorial and defend areas generally between 1 and 50 acres, depending on habitat quality, with the reported density of breeding territories varying between approximately four and 18 territories per 100 acres of habitat
- GCWA adults exhibit relatively high site fidelity between breeding seasons
- Annual survivorship estimated at 30% for juveniles and between 46% and 49% for adult males, with the oldest reported individual aged at 11 years



Texas Phenology

Potential Habitat

Breeding habitat is juniper-oak woodland typically with canopy cover between 35% and 100%. The likelihood of habitat occupancy reaches 50% in landscapes that are composed of at least 80% woodland cover. The following habitat estimates are from Morrison et al. (2010):

- Potential Breeding Habitat in Plan Area: 4,148,149 acres
- Potential Breeding Habitat in Range: 4,148,149 acres

Population

SWCA (2018) estimates the following populations, based on estimates of available habitat and likelihood of occupancy (Morrison et al. 2010) and assumed territory density in habitat of average quality (Pulich 1976) by patch size categories:

- Number in Plan Area: 56,469 pairs
- Number in Range: 56,469 pairs

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Covered Activities involving clearing of GCWA habitat can reduce the amount of habitat available for use by the species (USWS 2014).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—Tied to habitat loss, fragmentation can reduce habitat patch sizes below the threshold used by the GCWA, indirectly causing habitat loss. Edge effects that may increase exposure to predators are possible (USFWS 2014).
3. COLLISION—Collision with transmission lines is not identified as a threat to migrating or breeding GCWA. GCWA are capable fliers and would be expected to move away from people and operating equipment during the conduct of Covered Activities; however, nests could be impacted by machinery operating in or adjacent to occupied habitat during the breeding season (Ladd and Gass 1999).
4. HERBICIDES—Application of herbicides is not anticipated in the dense forested areas preferred by breeding and foraging GCWA.
5. NOISE AND ACTIVITY DISTURBANCE—Noise and activity disturbances during the conduct of Covered Activities could affect GCWA breeding behaviors or breeding success (USFWS 2014). However, recent studies by Lackey et al. (2011) and Pruett et al. (2014) found road construction noise and activity have no effect on GCWA pairing success, territory placement, or productivity.
6. PREDATOR/PREY CHANGES—Covered Activities that modify vegetation within ROWs are unlikely to change insect communities in ways that substantially alter the GCWA prey base. Changes to potential predator populations may be possible if ROWs cross large patches of dense and previously unfragmented woodland potentially increasing the abundance and access of opportunistic species that prefer more open habitats (USFWS 2014).

Surrogate Test

1. CAUSAL LINK—Take that may occur via habitat loss and degradation, habitat fragmentation, edge effects, collision, and predator population changes is associated with the conduct of Covered Activities that modify habitat.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—The number and distribution of GCWAs in any particular area may naturally fluctuate within and between years, and the skill of the surveyor can affect survey results. It may not be possible to precisely identify or count those individuals taken via sub-lethal reductions in productivity, or determine the fate of individuals that do not return to the same breeding territory after migrating to and from wintering grounds.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation

- Delineate Suitable Habitat as defined in Campbell (2003) when consistent with "Habitat Types Where Warblers Are Expected To Occur" or "Habitat Types That May Be Used by Warblers"

Optional Avoidance Measures

- Avoid Covered Activities within or within 300 feet of Suitable or Occupied Habitat.

Presence/Absence Surveys

- Presence/Absence Surveys will follow the recommendations in USFWS (2010), or may be revised in the future.
- The delineation of Suitable Habitat (with assumed occupancy) can be refined to Occupied or Unoccupied Habitat based on a P/A survey conducted during the GCWA breeding season and immediately prior to the start of Covered Activities, where all clearing will occur prior to the next GCWA breeding season. P/A Surveys will be conducted within and within 300 feet of the Project Area
- Occupied Habitat is all Suitable Habitat within a 500-foot radius of a GCWA detection documented within the prior GCWA breeding season (encompasses a 18-acre area around the detection, approximately the size of an average GCWA territory), including consideration of prior detections by other surveyors made within the prior 10 years, as provided to LCRA TSC by the USFWS.
- Unoccupied Habitat is all Suitable Habitat more than 500 feet from a GCWA detection recorded within the prior GCWA breeding season.

Specific Minimization Measures

- Avoid clearing of Suitable or Occupied Habitat during the breeding season (March 1 through July 31).
- May conduct construction activities (as opposed to clearing) within 300 feet of Suitable or Occupied Habitat during the breeding season (March 1 through July 31), as long as those activities promptly follow permitted clearing and/or were initiated before March 1, therefore being a continuous activity that began before initiation of the breeding season.
- Follow established LCRA TSC corporate oak wilt prevention policies, based on Texas Forest Service and Texas AgriLife Extension Service recommendations, in areas where oak wilt is known to occur.
- Avoid stringing of transmission lines (conductor and shield wires) during the breeding season (March 1 through July 31) across Suitable or Occupied Habitat within the ROW unless using a land-based tensioning system that will prevent transmission lines from sagging into treetops.

Existing Impacts

- Existing Impacts apply to Suitable or Occupied Habitat that occurs within 300 feet of previously developed land uses and structures, including, but not limited to, any public roads, utility rights-of-way, or developed lands (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on the GCWA in the context of an incidental take assessment).

Direct Habitat Modification

- Direct Habitat Modification occurs where Suitable or Occupied Habitat is physically removed or altered beyond suitable use from Covered Activities.

Special Cases

- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Indirect Habitat Modification

- Indirect Habitat Modification occurs where Suitable or Occupied Habitat is within 300 feet of Covered Activities.

Sources: Campbell (2003); City of Austin et al. (2012); Diamond (2007); Duarte et al. (2013); Jetté et al. (1998); Ladd and Gass (1999); Lackey et al. (2011); Lockwood and Freeman (2014); Loomis-Austin, Inc. (2008); Mathewson et al. (2012); Morrison et al. (2010); Peak (2007); Peak and Thompson (2014); Pruett et al. (2014); Pulich (1976); Reidy et al. (2009); SWCA (2018); USFWS (2010, 2013, 2014, 2017)

Enrollment Scenario	Standard Mitigation Ratios	Mitigation Factors		
		Existing Impact	Relaxed Restrictions	Post-Enrollment Mitigation
Suitable Habitat with Assumed Occupancy	**Direct 2:1**	Direct: Standard Mitigation Ratio minus 50%	Standard Mitigation Ratios plus 100%	Standard Mitigation Ratios plus 25%
	Indirect 0.5:1	Indirect: No Mitigation		
Occupied Habitat with Demonstrated Occupancy	**Direct 3:1**	Direct: Standard Mitigation Ratio minus 50%	Standard Mitigation Ratios plus 100%	Standard Mitigation Ratios plus 25%
	Indirect 0.5:1	Indirect: No Mitigation		
Special Cases	**Direct 4:1**	Direct: Standard Mitigation Ratio minus 50%	Standard Mitigation Ratios plus 100%	Standard Mitigation Ratios plus 25%
	Indirect 1:1	Indirect: No Mitigation		

LCRA TSC-responsible Conservation Priorities and Crediting

LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion in Chapter 6.5.1 of the HCP. LCRA TSC acknowledges that the USFWS has published mitigation guidance for the GCWA (USFWS 2013) and, to the extent practicable, will rely on such guidance to help plan conservation actions.

Whooping Crane

Grus americana (WHCR)

Ecology

- Large, long-lived, migratory bird that winters along the Texas Gulf Coast, usually in or near the Aransas National Wildlife Refuge; though some WHCR winter at other locations
- WHCR arrive in Texas between late October to mid-November and fly to summer habitat between late March to early May
- WHCR migrate along a relatively narrow, 200-mile-wide corridor and stop each night to rest after traveling between 200 to 400 miles per day
- WHCR migrate as single individuals, pairs, family groups, or in small flocks, sometimes accompanying sandhill cranes
- Omnivore that consumes Carolina wolfberry (*Lycium carolinianum*), blue crab (*Callinectes sapidus*), a variety of clams, and other items at wintering grounds
- Sources of mortality during migration and in winter include collision with power lines, shootings, disease/infection, and natural causes
- The WHCR has also been recently documented in Brazoria and Galveston Counties (USFWS 2019; striped counties in Texas distribution map)

Texas Phenology

Potential Habitat

Winter habitat generally characterized as coastal salt flats and adjacent upland areas.

- Habitat in Plan Area: 373,806 acres (winter habitat)
- Habitat in Range: 373,806 acres (winter habitat)

Population

Butler and Harrell (2017) estimates the following 2016–2017 WHCR population that winters at or near the Aransas National Wildlife Refuge:

- Number in Plan Area: 437 individuals
- Number in Range: 437 individuals

An additional 141 individuals occur in one of three non-essential, experimental populations.

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Covered Activities are not expected to significantly change the character of the open marsh and upland habitats used by WHCR during the winter or migration. There is no information to suggest that the presence of transmission lines is likely to displace an individual from a wintering territory.
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—Habitat fragmentation and edge effects are not likely to be a significant concern for WHCR because its habitat is a naturally patchy mosaic of wetland and open grassland (Urbanek and Lewis 2015).
3. COLLISION—WHCR are known to collide with transmission lines, especially as juveniles, but this risk is reduced with the application of best practices to mark the locations of lines. Collision with equipment and machinery used during Covered Activities is unlikely because WHCR on their wintering grounds are fully mobile individuals (USFWS 2012).
4. HERBICIDES—Herbicide application within ROWs could degrade local foraging resources (e.g., *Lycium carolinianum*, a major winter food source) (USFWS 2012).
5. NOISE AND ACTIVITY DISTURBANCE—Noise and activity disturbances from the conduct of Covered Activities during the wintering season could annoy WHCR and temporarily displace them from preferred feeding or resting sites limiting their ability to obtain food resources (USFWS 2012).
6. PREDATOR/PREY CHANGES—The Covered Activities are not expected to significantly change land uses or land covers in the vicinity of ROWs. Therefore, populations of invertebrate prey or other predators are also not expected to significantly change.

Surrogate Test

1. CAUSAL LINK—Take of the WHCR may occur in response to the activity of people, equipment, and machinery during the conduct of Covered Activities in WHCR wintering habitat when birds are present. Similarly, legal application of herbicides in occupied wintering habitat could take individual WHCR.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—WHCR occupy large wintering territories and it may not be possible to precisely identify or count those individuals taken via sub-lethal effects or to determine the fate of individuals that do not return to the same area after migrating to and from wintering grounds.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation

- Delineate Suitable Habitat to include areas of coastal prairie and coastal wetlands, excluding developed or wooded areas, that occur within the WHCR winter range.

Optional Avoidance Measures

- Avoid surface disturbance within or within 1,000 feet of Suitable or Occupied Habitat.
- Conduct Covered Activities involving existing Facilities during the WHCR breeding season (April 15 through October 14), when the species is not typically present in Texas.

Presence/Absence Surveys

- Conduct presence/absence surveys during the overwintering period (October 15 through April 14).
- Conduct presence/absence surveys using aerial visual transect surveys. Level of effort to detect WHCR to follow the recommendations in USFWS (2016). LCRA TSC anticipates:
  - survey corridor to include 1 mile on either side of route centerline with transects spaced at 0.5-miles intervals within the survey corridor
  - perform 3 runs of the transect line during January and February
- USFWS has not published a recommended protocol for performing Presence/Absence Surveys.
- Presence/absence survey results (and delineations of Occupied Habitat) remain valid until the following October 15.
- Occupied Habitat is the area of Suitable Habitat within 2,000 feet of a WHCR detection (encompasses a 289-acre area around the detection, approximately the size of an average WHCR winter territory) or previously reported WHCR observations (LCRA TSC will request such data at least annually from the USFWS).

Specific Minimization Measures

- Avoid Covered Activities within Suitable or Occupied Habitat during the overwintering period (October 15 through April 14) without the presence of an environmental monitor.
- During the overwintering period (October 15 through April 14), embed environmental monitors with construction crews, during active construction, to ensure minimization measures are implemented as intended.
- Temporarily cease Covered Activities when environmental monitoring detects a WHCR within 1,000 feet of the Covered Activity. Resume Covered Activities when WHCR move beyond 1,000 feet of the Covered Activity.
- Avoid application of pesticides and herbicides within Suitable Habitat.

Existing Impacts

- Existing Impacts occur within 1,000 feet of aboveground structures, roads, parking areas, public beaches, or other developed areas (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on the WHCR in the context of an incidental take assessment).

Direct Habitat Modification

- Direct Habitat Modification consists of Suitable or Occupied Habitat that is physically altered by subsurface disturbances from Covered Activities.

Special Cases

- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Indirect Habitat Modification

- Indirect Habitat Modification consists of Suitable or Occupied Habitat that occurs within areas subject to surface disturbances or within 1,000 feet of surface disturbances from Covered Activities.

Sources: Butler and Harrell (2017); COSEWIC (2010); CWS and USFWS (2007); Howe (1987, 1989); Stehn and Wassenich (2008); Urbanek and Lewis (2015); USFWS (2009, 2012, 2015, 2016); USFWS (2019; personal communication from Christina Williams)

Enrollment Scenario	**Standard Mitigation Ratios**	**Mitigation Factors**		
		Existing Impact	**Relaxed Restrictions**	**Post-Enrollment Mitigation**
Suitable Habitat with Assumed Occupancy	**Direct 1:1** **Indirect 0.25:1**	Standard Mitigation Ratio minus 50%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%
Occupied Habitat with Demonstrated Occupancy	**Direct 2:1** **Indirect 0.5:1**	Standard Mitigation Ratio minus 50%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%
Special Cases	**Direct 4:1** **Indirect 1:1**	Standard Mitigation Ratio minus 50%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%

LCRA TSC-responsible Conservation Priorities and Crediting

LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion in Chapter 6.5.1 of the HCP. LCRA TSC will focus conservation actions on WHCR wintering habitats, including currently unoccupied but potential future wintering habitats.

Piping Plover

Charadrius melodus (PIPL)

Ecology

- Migratory shorebird, winters along the Texas coast. PIPL may also occur as a scarce migrant through the eastern part of Texas.
- PIPL arrive in Texas between late June and early September, reside on wintering grounds from September through early February, and leave for breeding grounds between February and early May
- PIPL mostly reside on the ground, but make short flights (generally less than 35 feet above ground) within a home range of approximately 3,100 acres when not migrating
- PIPL exhibit strong site fidelity to nonbreeding areas from fall through spring, but may use different habitats within the home range during this period
- PIPL may live for generally 5 to 10 years
- Density in some winter habitats shown to vary greatly from 0 to 61 birds/acre

Texas Phenology

Potential Habitat

Winter habitat occurs in association with coastal habitats such as tidal flats, beaches, mudflats, algal flats, washovers, and dredge spoil islands. The following estimates are from wintering habitat only.

- Potential Winter Habitat in Plan Area: 243,751 acres
- Potential Winter Habitat in Range (USA): 313,644 acres

Population

The following minimum population estimates are from the 2011 International Census of PIPL (Elliott-Smith et al. 2015):

- Number in Plan Area: 2,145 individuals
- Number in Range: 5,723 individuals

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Habitat loss and degradation is an identified threat to PIPL wintering habitats. Covered Activities would rarely occur in PIPL winter habitats, but if such habitat occurs within ROWs, then the operation of machinery and construction of Facilities could cause the loss or degradation of winter habitat potentially through avoidance behaviors (USFWS 2015).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—Habitat fragmentation at the scale of a ROW is not known to be a threat to wintering PIPLs, as their habitat is naturally patchily distributed across the Texas coast. Similarly, the species uses relatively open and dynamic habitats that include a mosaic of land cover and vegetation types (Elliott-Smith and Haig 2004). Edge effects are not likely to adversely affect the species.
3. COLLISION—Collision with transmission lines is not identified as a threat to migrating or wintering PIPLs, although collision with power lines is identified as a threat for the Northern Great Plains population on their breeding grounds. PIPLs are capable fliers and would be expected to move away from people and operating equipment during the conduct of Covered Activities (USFWS 2015).
4. HERBICIDES—Application of herbicides is not anticipated in the tidal, riverine, or wetland areas used by PIPLs.
5. NOISE AND ACTIVITY DISTURBANCE—Noise and activity disturbances during the conduct of Covered Activities can cause PIPLs to avoid areas of habitat or decrease the time spent on normal foraging and roosting activities (USFWS 2015).
6. PREDATOR/PREY CHANGES—The Covered Activities are not expected to alter the landscape in a manner that would significantly change predator or prey populations.

Surrogate Test

1. CAUSAL LINK—Take that may occur via habitat loss and degradation and noise and activity disturbances are related to Covered Activities that modify habitat. Collision is linked to the presence of structures constructed or operated and maintained by LCRA TSC that modify the PIPL habitat by adding potential obstructions to the landscape.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—The migration period for PIPL is long and individuals use different habitats over the duration of the wintering season in ways that change the number of individuals present at any given location within and between years. Skill of the surveyor can affect survey results.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation

- Suitable Habitat is limited to the extent of wintering habitat along the Texas Gulf Coast, and does not include migratory stopovers.
- Suitable Habitat includes coastal intertidal beaches, related backbeach areas (i.e., high tide line to the edge of a dune or vegetation line), unvegetated or sparsely vegetated sand/mud/algal flats, spits, salterns, unvegetated washovers, seasonally emergent flats, or similar conditions mimicked by artificial habitat (e.g., dredge spoil piles).

Optional Avoidance Measures

- Avoid Covered Activities within, or within 1,000 feet of, Suitable or Occupied Habitat.

Presence/Absence Surveys

- Conduct presence/absence surveys during the overwintering period (September 1 through February 28/29) using the following methods:
  - Walk transects along the edge of the Suitable Habitat (e.g., along dune lines) during daylight hours (30 minutes after sunrise to 30 minutes before sunset)
  - 5 survey visits at least 10 days apart, with transects walked twice per visit and at least 5 hours apart
  - Survey pace of 30 minutes per 0.5 mile of transect
- USFWS has not published a recommended protocol for performing Presence/Absence Surveys.
- Occupied Habitat is the area of Suitable Habitat within 300 feet of a PIPL detection, including consideration of prior detections by other surveyors as provided to LCRA TSC by the USFWS on at least an annual basis.
- Presence/absence survey results (and delineations of Occupied Habitat) remain valid until the following September 1.

Specific Minimization Measures

- Conduct Covered Activities in Suitable Habitat during the PIPL breeding season (March 1 through August 31), when the species is not typically present in Texas.
- Establish 15-mile-per-hour (or less) speed limits within Suitable or Occupied Habitat during overwintering period (September 1 through February 28/29).
- Restore surface elevations after any ground disturbance, including smoothing out any deep ruts in Suitable or Occupied Habitat following construction.
- Avoid altering topography and naturally vegetated dunes adjacent to Suitable or Occupied Habitat to the maximum extent practicable.

Existing Impacts

- Existing Impacts occur within 1,000 feet of aboveground structures, roads, parking areas, public beaches, or other developed areas (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on the PIPL in the context of an incidental take assessment).

Direct Habitat Modification

- Direct Habitat Modification consists of Suitable or Occupied Habitat that is physically altered by subsurface disturbances from Covered Activities.

Special Cases

- Covered Activities performed within designated Critical Habitat.
- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Indirect Habitat Modification

- Indirect Habitat Modification consists of Suitable or Occupied Habitat that occurs within areas subject to surface disturbances or within 1,000 feet of surface disturbances from Covered Activities.

Sources: Drake et al. (2001); Elliott-Smith et al. (2015); Elliott-Smith and Haig (2004); Gratto-Trevor et al. (2012); Lockwood and Freeman (2014); Nicholls and Baldassarre (1990a, 1990b); Stantial and Cohen (2015); USFWS (2015); Zonick (2000)

Enrollment Scenario	**Standard Mitigation Ratios**	**Mitigation Factors**		
		Existing Impact	**Relaxed Restrictions**	**Post-Enrollment Mitigation**
Suitable Habitat with Assumed Occupancy	**Direct 1:1** **Indirect 0.1:1**	Standard Mitigation Ratio minus 90%	Standard Mitigation Ratio plus 10%	Standard Mitigation Ratio plus 25%
Occupied Habitat with Demonstrated Occupancy	**Direct 1.5:1** **Indirect 0.2:1**	Standard Mitigation Ratio minus 90%	Standard Mitigation Ratio plus 10%	Standard Mitigation Ratio plus 25%
Special Cases	**Direct 2:1** **Indirect 0.4:1**	Standard Mitigation Ratio minus 90%	Standard Mitigation Ratio plus 10%	Standard Mitigation Ratio plus 25%

LCRA TSC-responsible Conservation Priorities and Crediting

LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion in Chapter 6.5.1 of the HCP. LCRA TSC anticipates that Mitigation actions appropriate for Covered Activities involving Operations and Maintenance activities could include removal of dangling fishing line from electric transmission lines in coastal areas and suggests crediting at 0.5 credit per acre for the area within 300 feet of any removed fishing line.

Rufa Red Knot

Calidris canutus rufa (REKN)

Ecology

- Migratory shorebird that migrates through Texas and may winter within the Plan Area from September through May although, some REKN may remain year-round during their first year.
- Individual REKN generally return to same wintering grounds each year
- Migrating REKN may fly directly from Hudson Bay (Canada) to Texas and require adequate food supply to replenish energy
- Beach habitats are generally preferred due to the presence of food items
- Consume small, hard-shelled mollusks (mussels, clams, snails) and their larvae, shrimp, crabs, and marine worms while in winter habitat

Texas Phenology

Potential Habitat

REKN generally prefer sandy beaches and intertidal flats in Plan Area with abundant food availability, but also utilize extensive tidal flats on bay sides of barrier islands.

- Potential Habitat in Plan Area: 243,751 acres
- Potential Wintering Habitat in Range (USA): 601,018 acres

Population

The following include the Newstead et al. (2013) estimated wintering population in Texas and the Andres et al. (2012) estimated range-wide population:

- Number in Plan Area: 2,000 individuals
- Number in Range: 42,000 individuals

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Habitat loss and degradation due to coastline development is considered a threat to the species. REKN is also vulnerable to noise-related disturbances adjacent to machinery (USFWS 2013, 2014).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—Fragmentation is not listed as a threat to REKN (USFWS 2014). Edge effects are not likely to adversely affect the species.
3. COLLISION—REKN are not known to collide with transmission lines or towers. They are capable fliers and would be expected to move away from people and operating equipment during the conduct of Covered Activities (USFWS 2013,2014).
4. HERBICIDES—Application of herbicides is not anticipated in the areas used by REKN.
5. NOISE AND ACTIVITY DISTURBANCE—The noise and activity of people, equipment, and machinery during the conduct of Covered Activities adjacent to feeding REKN could cause the species to abandon food sources, avoid areas of habitat, or decrease the time spent on normal foraging and roosting activities (USFWS 2013,2014).
6. PREDATOR/PREY CHANGES—The addition of new transmission lines near REKN feeding habitat could increase the number of perches for predatory raptors that could increase predation risk (USFWS 2013). The Covered Activities are not expected to affect the invertebrate prey used by the REKN.

Surrogate Test

1. CAUSAL LINK—Take is most likely via noise and activity disturbances or by enhancing the foraging behavior of predatory raptors near active REKN feeding sites. The opportunity for take is directly related to the presence of occupied feeding habitat within or adjacent to ROWs.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—The migration period for REKN is long and individuals use different habitats over the duration of the wintering season in ways that change the number of individuals present at any given location within and between years. Skill of the surveyor can affect survey results.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation

- Suitable Habitat is limited to the extent of wintering habitat along the Texas Gulf Coast, and does not include migratory stopovers.
- Suitable Habitat includes coastal intertidal beaches, related backbeach areas (i.e., high tide line to the edge of a dune or vegetation line), unvegetated or sparsely vegetated sand/mud/algal flats, spits, salterns, unvegetated washovers, or similar conditions mimicked by artificial habitat (e.g., dredge spoil piles).

Optional Avoidance Measures

- Avoid subsurface disturbance within, or within 1,000 feet of, Suitable or Occupied Habitat.

Presence/Absence Surveys

- Conduct presence/absence surveys during the prime overwintering period (December 1 through March 31) using the following methods:
  - Walk transects along the edge of the Suitable Habitat (e.g., along dune lines or above the wrack line when tides are low) during daylight hours (30 minutes after sunrise to 30 minutes before sunset)
  - 5 survey visits at least 10 days apart, with transects walked twice per visit and at least 5 hours apart
  - Survey pace of 30 minutes per 0.5 mile of transect
- USFWS has not published a recommended protocol for performing Presence/Absence Surveys.
- Occupied Habitat is the area of Suitable Habitat within 300 feet of a REKN detection, including consideration of prior detections by other surveyors as provided to LCRA TSC by the USFWS on at least an annual basis.
- Presence/absence survey results (and delineations of Occupied Habitat) remain valid until the following November 1.

Specific Minimization Measures

- Conduct Covered Activities in Suitable or Occupied Habitat during the REKN breeding season (April 1 through November 31), when the species is not typically present in Texas.
- Establish 15-mile-per-hour (or less) speed limits within Suitable or Occupied Habitat during overwintering period (December 1 through March 31).
- Restore surface elevations after any ground disturbance, including smoothing out any deep ruts (i.e., 2 inches or deeper) in Suitable or Occupied Habitat following construction.
- Avoid altering topography and naturally vegetated dunes adjacent to Suitable or Occupied Habitat to the maximum extent practicable.

Existing Impacts

- Existing Impacts occur within 1,000 feet of aboveground structures, roads, parking areas, public beaches, or other developed areas (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on the REKN in the context of an incidental take assessment).

Direct Habitat Modification

- Direct Habitat Modification consists of Suitable or Occupied habitat that is physically altered by subsurface disturbances from Covered Activities.

Special Cases

- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Indirect Habitat Modification

- Indirect Habitat Modification consists of Suitable or Occupied Habitat that occurs within areas subject to surface disturbances or within 1,000 feet of surface disturbances from Covered Activities.

Sources: Andres et al. (2012); Harrington (2001); Lockwood and Freeman (2014); Newstead et al. (2013); Niles et al. (2008); USFWS (2013, 2014); Wells (2007)

Enrollment Scenario	**Standard Mitigation Ratios**	**Mitigation Factors**		
		Existing Impact	**Relaxed Restrictions**	**Post-Enrollment Mitigation**
Suitable Habitat with Assumed Occupancy	**Direct 1:1** **Indirect 0.1:1**	Standard Mitigation Ratio minus 90%	Standard Mitigation Ratio plus 10%	Standard Mitigation Ratio plus 25%
Occupied Habitat with Demonstrated Occupancy	**Direct 1.5:1** **Indirect 0.2:1**	Standard Mitigation Ratio minus 90%	Standard Mitigation Ratio plus 10%	Standard Mitigation Ratio plus 25%
Special Cases	**Direct 2:1** **Indirect 0.4:1**	Standard Mitigation Ratio minus 90%	Standard Mitigation Ratio plus 10%	Standard Mitigation Ratio plus 25%

LCRA TSC-responsible Conservation Priorities and Crediting

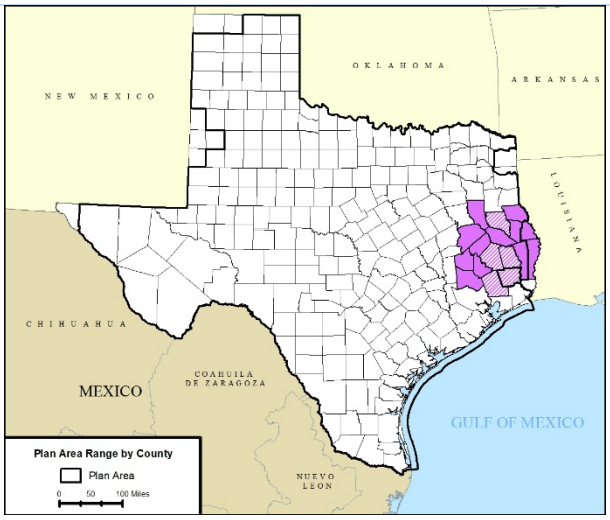
LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion in Chapter 6.5.1 of the HCP. LCRA TSC anticipates that Mitigation actions appropriate for Covered Activities involving Operations and Maintenance activities could include removal of dangling fishing line from electric transmission lines in coastal areas and suggests crediting at 0.5 credit per acre for the area within 300 feet of any removed fishing line.

Red-cockaded Woodpecker

Picoides borealis (RCWO)

Ecology

- Non-migratory bird living in cooperative breeding groups referred to as clusters of 2 to 6 individuals
- RCWO eat mostly arthropods, but will consume seeds and small fruit
- Reproduction occurs from April through July
- RCWO group home range ranges between 60 to 360 acres, with most home ranges exceeding 100 acres
- Most family groups in Texas inhabit National Forest land
- RCWO construct nest and roost cavities that are typically 20 to 50 feet above the ground, in live pine trees at least 60 years old or more; cavity excavation can require between 2 and 13 years
- Long-lived species with the oldest recorded individual reaching 16 years of age
- RCWO may be extirpated from Hardin, Liberty, Nacogdoches, Polk, and Tyler Counties (USFWS 2019; striped counties in Texas distribution map)



Texas Phenology

Potential Habitat

RCWO occur in mature open pine forests. The following habitat extent is approximated by 2011 National Land Cover Database evergreen forest cover within counties deemed occupied by USFWS Environmental Conservation Online System.

- Potential Habitat in Plan Area: 2,131,202 acres
- Potential Habitat in Range: 24,407,002 acres

Population

USFWS (2006, 2017) reports the following number of RCWO family groups in Texas:

- Number in Plan Area: <342 family groups or approximately 855 individuals
- Number in Range: 6,105 family groups or approximately 15,263 individuals

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Habitat removal or degradation may occur during Covered Activities involving vegetation clearing related to construction. Vegetation clearing could remove cavity trees or degrade foraging habitat (USFWS 2006).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS— Habitat fragmentation is one of the primary threats to the RCWO (USFWS 2003). However, habitat loss at the scale of a linear ROW less than 200 feet in width is not likely to fragment RCWO foraging habitat because individuals will regularly fly across such distances (Jackson 1994).
3. COLLISION—RCWO are not known to collide with transmission lines or other structures. Collision is possible if an active nest tree is destroyed by equipment or machinery used during Covered Activities.
4. HERBICIDES—Localized applications of herbicides to control vegetation within ROWs is possible, but are not likely to affect RCWO that forage high in the forest canopy (Jackson 1994).
5. NOISE AND ACTIVITY DISTURBANCE—Noise and activity disturbances could harass RCWO if Covered Activities are performed in or adjacent to nesting or roosting cavity trees resulting in avoidance behaviors or abandonment of a nesting cavity (Jackson 1994).
6. PREDATOR/PREY CHANGES—The Covered Activities are not expected to significantly alter prey populations. Linear clearings through RCWO habitat could promote predator populations that are better adapted to more open or edge habitats (Jackson 1994, USFWS 2006).

Surrogate Test

1. CAUSAL LINK—The USFWS identifies the loss of old growth pine forest habitat as a threat to the species. Potential edge effects and changes in predator populations are directly related to habitat modifications. Collision, noise, and activity disturbances occur when equipment and machinery modify RCWO habitat during the conduct of Covered Activities.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—Distinguishing take caused by the Covered Activities from death or injury of RCWO caused by other factors unrelated to the Covered Activities is not practicable.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation

- Delineate Suitable Habitat following USFWS-recommended protocols (USFWS 2003).

Optional Avoidance Measures

- Avoid Covered Activities within, or within 300 feet of, Suitable or Occupied Habitat.

Presence/Absence Surveys

- Presence/Absence Surveys will follow the recommendations in USFWS (2003), or may be revised in the future.
- The delineation of Suitable Habitat (with assumed occupancy) can be refined to Occupied or Unoccupied Habitat based on a single year of survey results completed no more than three survey seasons prior to the start of Covered Activities.
- Occupied Habitat is all Suitable Habitat within, or within 0.5-mile radius of, an Active Cluster. Occupied Habitat will also include the area within 0.5 mile of any previously documented Active Cluster.
- Unoccupied Habitat is all Suitable Habitat more than a 0.5-mile radius from an Active Cluster.

Specific Minimization Measures

- Avoid Covered Activities requiring mechanical equipment within 50 feet of a cavity tree or 200 feet of a cavity tree during the breeding season (April 1 through July 31).
- Avoid Clearing of Suitable or Occupied Habitat during the breeding season (April 1 through July 31).
- Avoid performing Covered Activities within one hour after sunrise and one hour before sunset inside an Active Cluster.
- Within Active Clusters, restrict vehicle use to existing access roads and avoid construction of new access roads outside of ROWs.

Existing Impacts

- Existing Impacts apply to Suitable or Occupied Habitat that occurs within 300 feet of previously developed land uses and structures, including, but not limited to, any public roads, utility rights-of-way, or developed lands (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on the RCWO in the context of an incidental take assessment).

Direct Habitat Modification

- Direct Habitat Modification consists of surface disturbances within Suitable or Occupied Habitat.

Special Cases

- Covered Activities within the boundary of an Active Cluster.
  - Direct Habitat Modification from Covered Activities within an Active Cluster requires the translocation of the Active Cluster following standard translocation techniques described in DeFazio et al. (1987), if the Covered Activities remove active cavity trees.
  - Coordinate salvage collection and relocation with USFWS and TPWD staff, if deemed necessary by the USFWS to prevent the loss of the Active Cluster.
- Covered Activities that cause the amount of foraging habitat within 0.5-mile of the center of an Active Cluster to fall below a threshold of 75 acres.
- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Indirect Habitat Modification

- Indirect Habitat Modification consists of Suitable or Occupied Habitat that occurs within 300 feet of surface disturbances.

Sources: Campbell (2003); DeFazio et al. (1987); Homer et al. (2015); Jackson (1994); USFWS (2003, 2006, 2017); USFWS (2019; personal communication from Christina Williams)

Enrollment Scenario	**Standard Mitigation Ratios**	**Mitigation Factors**		
		Existing Impact	**Relaxed Restrictions**	**Post-Enrollment Mitigation**
Suitable Habitat with Assumed Occupancy	**Direct 1:1** **Indirect 0.5:1**	Standard Mitigation Ratio minus 50%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%
Occupied Habitat with Demonstrated Occupancy	**Direct 2:1** **Indirect 1:1**	Standard Mitigation Ratio minus 50%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%
Special Cases	**Direct 3:1** **Indirect 1:1 (translocate Active Cluster)**	Standard Mitigation Ratio minus 50%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%

LCRA TSC-responsible Conservation Priorities and Crediting

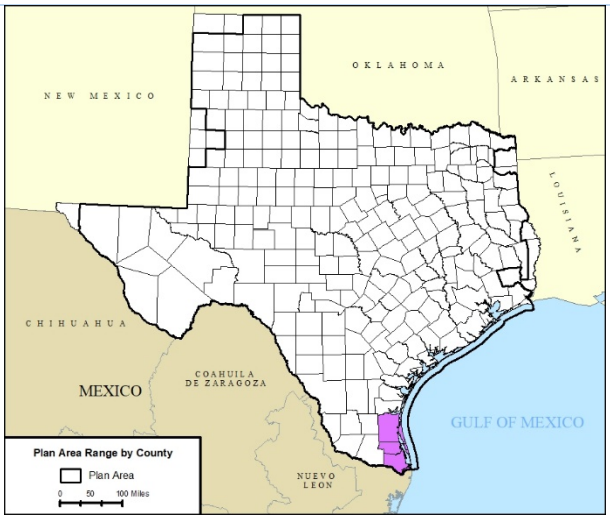
LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion in Chapter 6.5.1 of the HCP. LCRA TSC will also prioritize conservation actions that are of a similar type as the form of take (i.e., in-kind mitigation, where removal of cavity trees is balanced by actions that create new nesting cavities or where modifications of foraging habitat is balanced by actions that control understory brush in foraging habitat).

Ocelot

Leopardus pardalis

Ecology

- Medium-bodied, spotted, cryptic, and solitary cat that may live for at least 15 years in the wild
- Texas represents a very small part of the species' range, which also includes much of Mexico, Central America, and South America; documented breeding populations occurring in three Texas counties
- Ocelots are most active from sunset to sunrise prowling for vertebrate prey within a home range that may measure 1 to 4 square miles
- Females use two to six dens, usually hidden in dense cover, to raise litters of one or two kittens
- Subadults often engage in long-distance dispersal, with recorded distances of up to 22 miles
- Collision with vehicles on roads is the largest source of documented mortality for the species in Texas



Texas Phenology

Potential Habitat

In Texas, breeding habitat is vertically dense thornscrub with at least 75% canopy cover. Potential breeding habitat can include, but is not limited to, linear or non-linear patches, stands, mattes, blocks, or lines of Tamaulipan thornscrub; riparian; live oak habitat; vegetated drainage ditches, irrigation canals, or fence lines; or other thickly vegetated corridors or habitats.

- Potential Breeding Habitat in Plan Area: 78,289 acres in 3 counties
- Potential Habitat in Range: 6,443,668 square miles south of the United States

Population

Population estimates are difficult to produce because of the wide, multi-national range and cryptic habits of the ocelot. The following include the Plan Area estimate from USFWS (2016) and range-wide estimate from Defenders of Wildlife (2017).

- Population in Plan Area: 80 individuals
- Population in Range: >800,000 individuals

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Removal of dense thornscrub within ROWs would reduce available habitat for ocelots, which is already a limiting resource for the species in Texas (USFWS 2006).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—Ocelot habitat is already significantly fragmented, and most habitat patches are small and isolated. Fragmentation of remaining patches may render remaining patches unusable or less suitable for ocelots by reducing a patch to an unusable size and impeding dispersal of individuals (USFWS 2006). Adverse edge effects, aside from fragmentation, are not likely.
3. COLLISION—Collision is not expected from conduct of the Covered Activities because vehicular travel within ROWs occurs via unimproved access roads where slow travel speeds are required. Ocelots are sensitive to human activity and mobile individuals would be expected to move away from active construction (USFWS 2006). Likewise, females would likely move kittens to alternate den sites before collisions occur.
4. HERBICIDES—Ocelots use a large home range and the limited application of herbicides would not likely affect a large portion of an individual's home range (USFWS 2006).
5. NOISE AND ACTIVITY DISTURBANCE—Relatively short periods of noise or human activity are not likely to harass ocelots because mobile individuals may simply move to another part of their large home range. Ocelots rarely use the same daytime resting site on consecutive days, unless denning (Murray and Gardner 1997). Likewise, females would likely move kittens to alternate den sites away from noise and activity.
6. PREDATOR/PREY CHANGES—Covered Activities are unlikely to significantly alter ocelot prey populations, because of the relatively narrow linear corridors associated with most Facilities and land uses that remain relatively similar to the surrounding landscape.

Surrogate Test

1. CAUSAL LINK—Take in the form of harm that may arise from habitat loss and fragmentation are related to aspects of the Covered Activities that directly or indirectly modify ocelot habitats.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—Ocelots are cryptic, travel great distances, are active mostly at night, and occupy large home ranges. It is not practical to track the location and behavior of individual ocelots across their home ranges to determine if individuals have indeed been killed or injured by significant disruptions of essential breeding feeding and sheltering activities because LCRA TSC does not have access to lands outside of its ROWs.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation
- Suitable Habitat is dense thornscrub vegetation within counties having a documented breeding population.

Optional Avoidance Measures
- Avoid Covered Activities within 500 feet of Suitable Habitat.

Presence/Absence Surveys
- Presence/Absence Surveys to refine Suitable Habitat into areas of Occupied or Unoccupied Habitat are not proposed.

Specific Minimization Measures
- Conduct Covered Activities during daylight hours to avoid light and noise disturbances during the night.
- Direct artificial lighting on Facilities towards the Facility and shield to minimize night-time disturbance.
- Contain and remove daily all garbage and foodstuff from work sites to prevent attracting prey species.
- Establish 25-mile-per-hour (or less) speed limits within, or within 500 feet of, Suitable Habitat.
- Embed environmental monitors with construction crews, during active construction, to ensure minimization measures are implemented as intended.

Existing Impacts
- Existing Impacts apply to Suitable Habitat that occurs within 500 feet of previously developed land and structures, including, but not limited to, any public roads, utility rights-of-way, or developed lands (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on the ocelot in the context of an incidental take assessment).

Direct Habitat Modification
- Direct Habitat Modification consists of surface disturbances to Suitable Habitat.

Special Cases
- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Indirect Habitat Modification
- Indirect Habitat Modification consists of Suitable Habitat that occurs within 500 feet of surface disturbances from Covered Activities.

Sources: Campbell (2003); Defenders of Wildlife (2017); Haines et al. (2006); Harveson et al. (2004); Horne (1998); Laack et al. (2005); Murray and Gardner (1997), Tewes et al. (1995); USFWS (2016); USFWS (2018; personal communication from Hilary Swarts); USFWS (2018; personal communication from Christina Williams)

Enrollment Scenario	**Standard Mitigation Ratios**	**Mitigation Factors**		
		Existing Impact	**Relaxed Restrictions**	**Post-Enrollment Mitigation**
Suitable Habitat with Assumed Occupancy	**Direct 3:1** **Indirect 0.5:1**	Direct: Standard Mitigation Ratio minus 50% Indirect: No Mitigation	Standard Mitigation Ratio plus 10%	Standard Mitigation Ratio plus 25%
Occupied Habitat with Demonstrated Occupancy	**N/A**	N/A	N/A	N/A
Special Cases	**Direct 6:1** **Indirect 1:1**	Direct: Standard Mitigation Ratio minus 50% Indirect: No Mitigation	Standard Mitigation Ratio plus 10%	Standard Mitigation Ratio plus 25%

LCRA TSC-responsible Conservation Priorities and Crediting

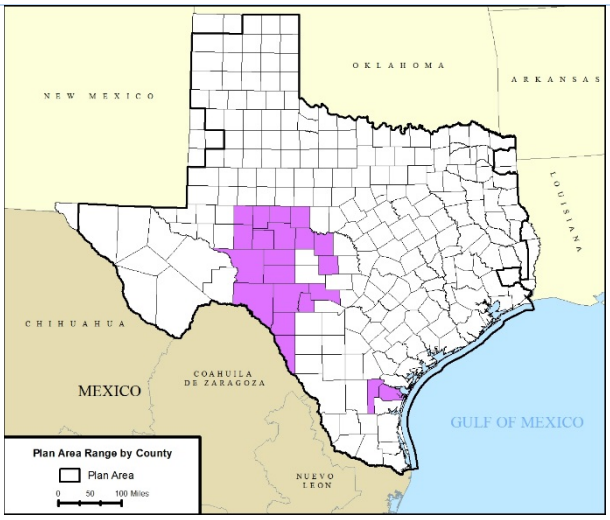
LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion in Chapter 6.5.1 of the HCP. LCRA TSC recognizes that The Conservation Fund has an active program to collect funds for the purchase of ocelot dispersal corridors and may represent a potential in-lieu fee program sponsor or Conservation Provider for LCRA TSC. To the extent practicable, LCRA TSC will prioritize conservation actions that contribute to this effort.

Spot-tailed Earless Lizard

Holbrookia lacerata (STEL)

Ecology

- Extremely wary, diurnally active lizard that seeks cover under objects or underground when disturbed
- Active when ground temperature exceeds approximately 82°F; more active (and observable) early in the summer, with activity decreasing in July and August
- Generalist predator on ground- or low vegetation-dwelling insects and arthropods
- Relatively small home range of 1.2 to 1.5 acres
- Lays eggs underground, with reproductive peaks in May or June and again in July or August
- Historic Texas range spans 75 counties. Current Texas range includes 21 counties with detections recorded between 2000 and 2016



Texas Phenology

Potential Habitat

STEL occur in sparse grassland and disturbed areas along drainages and usually associated with early successional vegetation communities. Suitable habitat may occur in mesquite savannas, live oak savannas, coastal prairies, stony plateaus, and other areas.

- Potential Habitat in Plan Area: 9.5 million acres
- Potential Habitat in Range: 9.5 million acres (USA only)

Population

No published population abundance or density estimates are available for this species. STEL populations are thought to be large, based on low rates of recapture of marked individuals during surveys and numerous captures of unmarked individuals during repeat surveys of the same area. Recent detections of juvenile STEL have been recorded from across the current range.

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Covered Activities could replace some areas of suitable habitat with structure foundations, but unpaved access roads are likely to remain used by STEL (Duran et al. 2011). Vegetation and soil disturbance likely to improve habitat conditions (i.e., promote sparse, short herbaceous vegetation and small areas of disturbed soils) after implementation of a Covered Activity (LaDuc et al. 2016).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—Covered Activities and Facilities are unlikely to fragment the open habitat used by STEL (Duran et al. 2011; LaDuc et al. 2016), create barriers to dispersal, or introduce novel edge effects to adjacent habitats.
3. COLLISION—Collisions of STEL individuals with equipment and vehicles is possible when relatively small STEL home ranges overlap with ROWs. The species' habit of seeking cover when disturbed suggests that individuals may not flee from areas subject to Covered Activities increasing the likelihood of a potential encounter with an individual STEL (Axtel 1956).
4. HERBICIDES—Reductions of prey items or direct toxicity to applied herbicides are possible within home ranges that overlap with ROWs (USFWS 2011). Adverse effects are likely to be temporary as prey populations return to the disturbed area.
5. NOISE AND ACTIVITY DISTURBANCE—Long-duration, daytime disturbances may cause individual STEL to remain under cover for extended periods (Axtel 1956), forgoing foraging and other normal behaviors.
6. PREDATOR/PREY CHANGES—The Covered Activities are unlikely to significantly alter STEL prey populations, because of the relatively narrow linear corridors associated with most Facilities and land uses that remain relatively similar to the surrounding landscape.

Surrogate Test

1. CAUSAL LINK—Take that may arise from habitat loss and degradation, collisions with vehicles and equipment, direct toxicity from legally applied herbicides, and altered behavior from noise and activity disturbances are all related to aspects of the Covered Activities that modify STEL habitats. Because of the small home ranges for STEL individuals, effects of the Covered Activities that may cause take are tightly associated with the area of actual habitat modification.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—Full censuses of STEL populations within ROWs are not practicable. Recent survey efforts demonstrate low rates of recapture of marked individuals and numerous captures of unmarked individuals during repeat surveys of the same area.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation

- Suitable Habitat includes areas of sparse grassland and disturbed areas along drainages that are usually associated with early successional vegetation communities of the Great Plains ecoregion (e.g., mesquite savannas, coastal prairies, flay stony plateaus, and live oak savannas).

Optional Avoidance Measures

- Avoid Covered Activities within, or within 50 feet of, Suitable or Occupied Habitat.

Presence/Absence Surveys

- Conduct surveys following recommendations in Fitzgerald et al. (1997).
- USFWS has not published a recommended protocol for performing Presence/Absence Surveys.
- The delineation of Suitable Habitat (with assumed occupancy) can be refined to Occupied or Unoccupied Habitat based on a single year of survey results completed no more than three survey seasons prior to the start of Covered Activities.
- Occupied Habitat is all Suitable Habitat within a 150-foot radius of a documented STEL detection (encompasses a 1.5-acre area around the detection, approximately the size of an average STEL territory), including consideration of prior detections by other surveyors.
- Unoccupied Habitat is all Suitable Habitat more than 150 feet from a STEL detection.

Specific Minimization Measures

- No pesticide or herbicide applied within, or within 50 feet of, Suitable or Occupied Habitat.
- Establish 25-mile-per-hour (or less) speed limits within, or within 50 feet of, Suitable or Occupied Habitat.

Existing Impacts

- Existing Impacts apply to Suitable or Occupied Habitat that occurs within 50 feet of previously developed land and structures, including, but not limited to, any public roads, utility rights-of-way, or developed lands (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on the STEL in the context of an incidental take assessment).

Direct Habitat Modification

- Direct Habitat Modification consists of subsurface disturbances to Suitable or Occupied Habitat.

Special Cases

- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Indirect Habitat Modification

- Indirect Habitat Modification consists of surface disturbances to Suitable or Occupied Habitat.

Sources: Axtell (1956); Duran et al. (2011); Fitzgerald et al. (1997); LaDuc et al. (2016, 2017); Pierre et al. (2017); Texas Parks and Wildlife Department (2017); USFWS (2011); WildEarth Guardians (2010)

Enrollment Scenario	Standard Mitigation Ratios	Mitigation Factors		
		Existing Impact	Relaxed Restrictions	Post-Enrollment Mitigation
Suitable Habitat with Assumed Occupancy	**Direct 1:1** **Indirect 0.25:1**	Standard Mitigation Ratios minus 50%	Standard Mitigation Ratio plus 10%	Standard Mitigation Ratio plus 25%
Occupied Habitat with Demonstrated Occupancy	**Direct 2:1** **Indirect 0.5:1**	Standard Mitigation Ratios minus 50%	Standard Mitigation Ratio plus 10%	Standard Mitigation Ratio plus 25%
Special Cases	**Direct 3:1** **Indirect 0.75:1**	Standard Mitigation Ratios minus 50%	Standard Mitigation Ratio plus 10%	Standard Mitigation Ratio plus 25%

LCRA TSC-responsible Conservation Priorities and Crediting

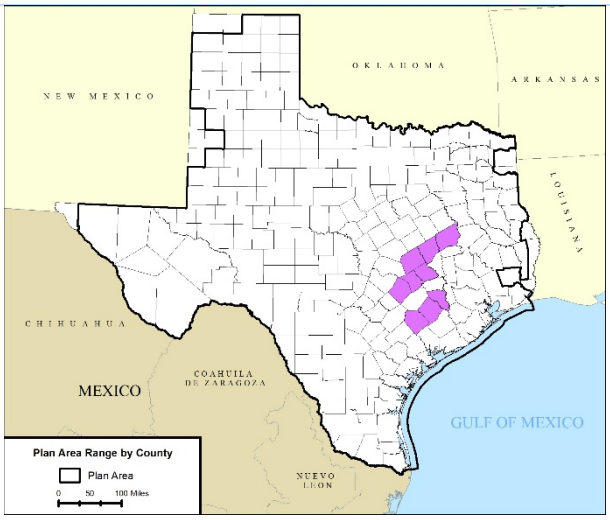
LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion in Chapter 6.5.1 of the HCP.

Houston Toad

Bufo (=*Anaxyrus*) *houstonensis* (HOTO)

Ecology

- Terrestrial amphibian most active at night during breeding season from late January to June
- Generally inactive during hot, dry seasons and during the coldest months of the year
- Species congregates at ponds when breeding and disperses into adjacent uplands during other times of the year; juveniles occasionally engage in long-distance dispersal
- Species seeks refuge in burrows excavated in sandy soils or may use other forms of cover



Texas Phenology

Potential Habitat

Generally, breeding and resident habitat requires forested areas over deep, sandy soils in proximity to potential breeding ponds. Dispersal habitat may include areas without canopy cover or deep, sandy soils. Habitat estimate from Buzo (2008) using the simple model and including areas of high or medium likelihood of use.

- Potential Habitat in Plan Area: 1.2 million acres
- Potential Habitat in Range: 1.2 million acres

Population

No reliable published population estimates are available for this species. Forstner et al. (2016) estimated approximately 2,500 individuals.

- Population in Plan Area: 2,500 individuals
- Population in Range: 2,500 individuals

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Removal of tree canopy from ROWs can degrade habitat quality or cause the loss of potential resting or wintering sites as HOTO show a strong affinity for forested or woodland vegetation (USFWS 2006, 2011). The addition of roads and structures can also remove potential resting or wintering sites (USFWS 2006).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—HOTO are able to disperse across open areas, soils unsuitable for burrowing, and roads (USFWS 2006). ROWs are not expected to fragment HOTO habitat.
3. COLLISION—Collision of HOTOs with vehicles, machinery, or equipment is possible when HOTOs are present under cover or in shallow burrows within ROWs during the conduct of Covered Activities, particularly during initial vegetation clearing in wooded areas (USFWS 2006).
4. HERBICIDES—HOTOs are not expected to regularly occur within ROWs following initial clearing as they show a strong affinity for forested and woodland vegetation (USFWS 2011), and are unlikely to be exposed to applied herbicides.
5. NOISE AND ACTIVITY DISTURBANCE—HOTOs are not known to be affected by noise or activity disturbances.
6. PREDATOR/PREY CHANGES—The Covered Activities are unlikely to significantly alter HOTO prey populations, because of the relatively narrow linear corridors associated with most Facilities and land uses that remain relatively similar to the surrounding landscape.

Surrogate Test

1. CAUSAL LINK—Take in the form of harm that may arise from habitat loss and degradation are related to aspects of the Covered Activities that directly or indirectly modify HOTO habitats.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—HOTOs are cryptic, mostly active at night, shelter underground or under cover, and rarely call outside of the breeding season. Small toadlets are difficult, if not impossible, to identify in the field by morphology. Counting the number of toads that may be present in ROWs, particularly during the winter, or that may otherwise disperse across ROWs is impractical.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation

- Suitable Habitat includes areas of deep sandy soils over Sparta Sand, Weches, Queen City Sand, Reklaw, Carrizo Sand, Goliad, Calvert Bluff, and Willis geologic formations that occur under tree canopy that with at least 50% canopy closure or within 100 feet of such tree cover.

Optional Avoidance Measures

- Avoid surface or subsurface disturbances within Suitable Habitat.

Presence/Absence Surveys

- Presence/Absence Surveys to refine Suitable Habitat into areas of Occupied or Unoccupied Habitat is not proposed.

Specific Minimization Measures

- Install toad exclusion fencing at the ROW perimeter when crossing Suitable Habitat (also closing the ends with flap gates or similar barriers), use USFWS-permitted biologists to search for and remove any individual HOTO from the exclusion zone, and monitor the integrity of the exclusion fencing for the duration of the Covered Activity.
- Avoid application of pesticides/herbicides within Suitable Habitat.
- Establish 25-mile-per-hour (or less) speed limits within Suitable Habitat during the breeding season (i.e., January 1 through June 30).
- For aspects of the Covered Activities that involve more than minimal vegetation or ground disturbance:
  - Install toad exclusion fencing at the ROW perimeter when crossing Suitable Habitat (also closing the ends with flap gates or similar barriers), use USFWS-permitted biologists to search for and remove any individual HOTO from the exclusion zone, and monitor the integrity of the exclusion fencing for the duration of the Covered Activity.
  - Perform such Covered Activities outside of the HOTO breeding season.

Existing Impacts

- Existing Impacts apply to Suitable Habitat that is coincident with impervious cover, developed cover, manicured landscape cover (e.g., lawns), cropland, or infrastructure rights-of-way (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on the HOTO in the context of an incidental take assessment).

Direct Habitat Modification

- Direct Habitat Modification consists of surface disturbances to Suitable Habitat.

Special Cases

- Covered Activities that occur within 300 feet of a known (i.e., previously documented) breeding pond located in Suitable Habitat. LCRA TSC will rely on data from the USFWS or other published sources to identify known breeding ponds.
- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Indirect Habitat Modification

- Indirect Habitat Modification consists of areas of Suitable Habitat within 50 feet of surface disturbances

Sources: Buzo (2008); Campbell (2003); Forstner and Dixon (2010); Forstner et al. (2007, 2016); USFWS (2007, 2011, 2017a, 2017b); Vandewege et al. (2013)

Enrollment Scenario	**Standard Mitigation Ratios**	**Mitigation Factors**		
		Existing Impact	**Relaxed Restrictions**	**Post-Enrollment Mitigation**
Suitable Habitat with Assumed Occupancy	**Direct 1:1**	Direct: Standard Mitigation Ratio minus 90% Indirect: No Mitigation	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%
	Indirect 0.5:1			
Occupied Habitat with Demonstrated Occupancy	**N/A**	N/A	N/A	N/A
Special Cases	**Direct 5:1**	Direct: Standard Mitigation Ratio minus 90% Indirect: No Mitigation	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%
	Indirect 2:1			

LCRA TSC-responsible Conservation Priorities and Crediting

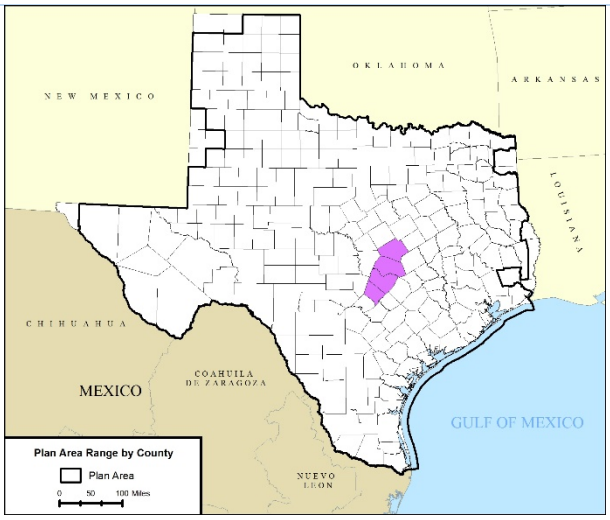
LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion in Chapter 6.5.1 of the HCP. LCRA TSC will prioritize conservation actions for Direct or Indirect Habitat Modification related to New Construction in HOTO Critical Habitat by prioritizing the placement of Mitigation in other areas of HOTO Critical Habitat. LCRA TSC acknowledges that the USFWS has published guidance for the management of HOTO habitat (USFWS 2017b) and, to the extent practicable, will rely on such guidance to help plan conservation actions.

Spring-adapted *Eurycea* Salamanders

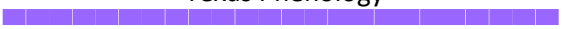
Salado Salamander *(Eurycea chisholmensis);* San Marcos Salamander *(Eurycea nana);* Georgetown Salamander *(Eurycea naufragia);* Barton Springs Salamander *(Eurycea sosorum);* Jollyville Plateau Salamander *(Eurycea tonkawae)*

Ecology

- Fully aquatic, neotenic salamanders that live in groundwater within and discharging from the Edwards and Trinity aquifers; use surface and subsurface aquatic habitats
- Reliant on a relatively narrow set of environmental conditions related to water chemistry (clean with low nitrogenous content), quantity (adequate spring flows at the surface), and generally cool water temperature (between 65°F and 86°F)
- Abundance on the surface varies widely, with an unknown portion of the population present within inaccessible parts of the aquifer
- Taxonomic uncertainty regarding species boundaries and assignments at known *Eurycea* localities; herein, species assignments follow USFWS critical habitat designations and Bendik et al. (2013)



Texas Phenology



Potential Habitat

Surface habitats are associated with spring outlets and spring runs, generally within 262 feet of the outlet. Subsurface habitats are relatively unstudied, but are likely to include the area within 984 feet of the spring outlet. The following habitat estimates, for the group, are based on the likely extent of subsurface habitat associated with known *Eurycea* localities.

- Potential Habitat in Plan Area: 9,936 acres
- Potential Habitat in Range: 9,936 acres

Population

No reliable published population estimates are available for any of the *Eurycea* species.

- Population in Plan Area: unknown
- Population in Range: unknown

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Clearing trees from riparian areas could alter the temperature of surface water habitat and degrade habitat quality. Soil disturbance along occupied spring runs could introduce sediment to the aquatic habitat and degrade habitat quality. Subsurface excavations, particularly for transmission tower footings, could intercept or alter groundwater flow paths and cause the loss of subsurface habitat (USFWS 2012).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—Limited subsurface excavations are unlikely to fragment the highly interconnected passages of the karst aquifer. Surface habitats are naturally fragmented at disjunct spring outlets (USFWS 2012). Edge effects are unknown.
3. COLLISION—Excavations through occupied groundwater conduits could intercept *Eurycea* individuals although the likelihood of such an event is unknown because little is known about how *Eurycea* use subsurface habitats (USFWS 2012).
4. HERBICIDES—*Eurycea* are unlikely to be exposed to applied herbicides. Direct toxicity of applied herbicides to prey eaten by *Eurycea* is possible (USFWS 2012).
5. NOISE AND ACTIVITY DISTURBANCE—No published information suggests that *Eurycea* are disturbed by noise or human activity.
6. PREDATOR/PREY CHANGES—The Covered Activities are unlikely to significantly alter *Eurycea* prey or predator populations because LCRA TSC is expected to avoid altering surface aquatic environments by spanning such areas.

Surrogate Test

1. CAUSAL LINK—Take in the form of harm that may arise from habitat loss and degradation are related to aspects of the Covered Activities that directly or indirectly modify *Eurycea* habitats.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—*Eurycea* salamanders are cryptic and shelter in the aquifer or under cover. An unknown portion of the population occurs within inaccessible subterranean habitats for unknown periods of time. Counting the number of salamanders that may be present in ROWs, particularly in the subsurface, is impractical, if not impossible.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation

- Suitable Habitat for each Covered Species in this group is the area within 984 feet of a spring outlet and associated spring run, pool, or lake edge within the known range of the Covered Species that discharges from the Edwards Aquifer.

Presence/Absence Surveys

- Known Occupied Features (REQUIRED) – Query USFWS to obtain the current locations of previously documented localities for these Covered Species during the Annual Coordination Meeting (see Chapter 8.2 of the HCP).
- Presence/Absence Surveys (OPTIONAL) -- Conduct surveys following USFWS 10(a)(1)(A) permit requirements at springs where presence is undetermined following recommendations in USFWS (2014), or may be revised in the future. If presence of a Covered Species is documented, then the spring becomes an "Occupied Spring Feature" for that Covered Species. If the Presence/Absence Surveys fail to detect the presence of a Covered Species in this group, then the spring becomes Unoccupied Habitat.
- Assumed Occupied Spring Features (REQUIRED) -- For Suitable Habitat where a Presence/Absence Survey is not conducted, the spring becomes an "Assumed Occupied Spring Feature" for the Covered Species with a range that overlaps the location of the spring.
- The limit of an Occupied Spring Feature or Assumed Occupied Spring Feature is the area within 984 feet of a spring outlet and associated spring run, pool, or lake edge within the known range of the Covered Species that discharges from the Edwards Aquifer. As a General Minimization Measure for the HCP, LCRA TSC agreed to avoid disturbances within 50 feet of the spring outlet and associated spring run to the maximum extent possible.
- For the purposes of applying the mitigation matrix below, Occupied Habitat is the area associated with an Occupied Spring Feature or Assumed Occupied Spring Feature.

Existing Impacts

- Existing Impacts apply to Occupied Habitat that is coincident with impervious cover, developed cover, manicured landscape cover (e.g., lawns), cropland, or infrastructure rights-of-way (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on these species in the context of an incidental take assessment).

Special Cases

- Covered Activities that occur within designated Critical Habitat.
- Covered Activities performed within 50 feet of an Occupied or Assumed Occupied Spring Feature
- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Optional Avoidance Measures

- Avoid surface or subsurface disturbances within Occupied Habitat.

Specific Minimization Measures

- Erect erosion and sediment controls, such as silt fencing, at the boundary of the 50-foot avoidance zone around the Occupied Spring Feature or Assumed Occupied Spring Feature that will remain for the duration of the construction and any post-construction restoration.
- Schedule grading and earthmoving operations to expose the smallest practical area for the shortest possible time.
- Implement a materials management plan to address the safe handling, storage, treatment, and/or disposal of materials brought into Suitable Habitat.
- Avoid application of pesticides and herbicides within Occupied Habitat.
- Embed environmental monitors with construction crews, during active construction, to ensure minimization measures are implemented as intended.
- Within Critical Habitat for these species, LCRA TSC will reclaim and restore the footprint of any existing Structure that is removed and not occupied by a replacement Structure. The reclamation/restoration will be to a condition substantially consistent with any immediately adjacent land cover, with a priority for matching natural cover types and native plants.

Direct Habitat Modification

- Direct Habitat Modification is subsurface disturbance within Occupied Habitat.

Indirect Habitat Modification

- Indirect Habitat Modification is surface disturbances that are limited to the addition of impervious cover (e.g., gravel placement for access roads or where surface grading is not necessary) within areas of Occupied Habitat not subject to Direct Habitat Modification.

Sources: Adcock et al. (2016); Barrett et al. (2010); Bendik (2006, 2017); Bendik et al. (2013, 2014, 2016); Bendik and Glusenkamp (2012); Bowles et al. (2006); Cambrian (2017); Chippindale (2012); Chippindale and Fries (2005); Chippindale and Price (2005); Chippindale et al. (2000); Crow (2015); Diaz et al. (2015b); Hillis et al. (2015); Krejca et al. (2017); Lucas et al. (2009); Nelson (1993); O'Donnell et al. (2008); Oborny (2016); Pierce and Wall (2011); Pierce et al. (2010, 2014); Smith (2011); Travis County (2017); USFWS (1980, 2012, 2013a, 2013b, 2013c, 2014)

Enrollment Scenario	**Standard Mitigation Ratios**	**Mitigation Factors**		
		Existing Impact	**Relaxed Restrictions**	**Post-Enrollment Mitigation**
Suitable Habitat with Assumed Occupancy	**N/A**	N/A	N/A	N/A
Occupied Habitat with Demonstrated Occupancy	**Direct: 5:1** **Indirect: 0.5:1**	Standard Mitigation Ratios minus 50%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%
Special Cases	**Direct: 20:1** **Indirect: 1:1**	Standard Mitigation Ratios minus 50%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%

LCRA TSC-responsible Conservation Priorities and Crediting

LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion

in Chapter 6.5.1 of the HCP. LCRA TSC anticipates that Mitigation for impacts to Occupied Habitat can be satisfied with the protection and management of undeveloped acres within the range of the associated Covered Species. LCRA TSC will prioritize available opportunities in the following manner: 1) lands within 984 feet of an Occupied Spring Feature; 2) lands within the spring shed of the Occupied Spring Feature or Assumed Occupied Spring Feature; 3) lands within the spring shed of another known Occupied Spring Feature for that Covered Species; 4) lands within the range of the associated Covered Species; and 5) lands within the recharge zone of the segment of the Edwards Aquifer that contains the Occupied Spring Feature or Assumed Occupied Spring Feature. LCRA TSC will prioritize mitigation within 984 feet of an occupied spring feature for habitat modification that occurs within 984 feet of an occupied spring feature. Anticipated crediting, subject to modifications as described in Chapter 6.5.2: 1) 1 acre of protection and management within the spring shed of the impacted Occupied Spring Feature or Assumed Occupied Spring Feature or within the spring shed of another such feature for that Covered Species = 1 credit; 2) 1 acre of protection and management within the general range of that Covered Species = 0.5 credit; 3) 1 acre of protection and management within the general recharge zone for that Covered Species = 0.1 credit. Management actions should improve the condition of the spring run (i.e., promote shading) or be designed to improve recharge.

Comal Springs Riffle Beetle

Heterelmis comalensis (CSRB)

Ecology

- An aquatic beetle that is known only to occur at two major spring complexes at San Marcos Springs and Comal Springs associated with the Edwards Aquifer, but is not known to occur in subterranean parts of the aquifer
- Closely associated with silt-free, gravel substrates within a few feet of a spring outlet, where they are found between gravel or under rocks in shallow riffle habitat
- Riffle beetles crawl across substrates in the water, and do not swim or fly
- Presumed diet is of spring-adapted biofilms of algae and fungi
- Species remains extant at Comal Springs despite a period of 5 months of no spring flow due to severe drought conditions; species possibly survived by retreating into the aquifer

Texas Phenology

Potential Habitat

Only known to be associated with surface aquatic habitats within a few feet of spring outlets at San Marcos Springs and Comal Springs. The following potential habitat is approximated by the extent of Critical Habitat designated for the species.

- Potential Habitat in Plan Area: 54 acres
- Potential Habitat in Range: 54 acres

Population

No reliable population estimates are available for this species.

- Population in Plan Area: unknown
- Population in Range: unknown

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Clearing trees from riparian areas could alter the temperature of surface water habitat and degrade habitat quality. Soil disturbance along occupied spring runs could introduce sediment to the aquatic habitat and degrade habitat quality. Subsurface excavations, particularly for transmission tower footings, could intercept or alter groundwater flow paths and cause the loss of habitat (USFWS 1997).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—Covered Activities will largely avoid surface aquatic habitats and are unlikely to fragment or introduce edge effects to CSRB habitat.
3. COLLISION—Collision of LCRA TSC machinery or equipment with CSRBs are not expected.
4. HERBICIDES—Direct toxicity of applied herbicides to individual riffle beetles or the biofilms eaten by the species is possible (USFWS 1997).
5. NOISE AND ACTIVITY DISTURBANCE—No published information suggests that riffle beetles are disturbed by noise or human activity.
6. PREDATOR/PREY CHANGES—The Covered Activities are unlikely to significantly alter prey or predator populations because LCRA TSC is expected to avoid altering surface aquatic environments by spanning such areas.

Surrogate Test

1. CAUSAL LINK—Take in the form of harm that may arise from habitat loss and degradation are related to aspects of the Covered Activities that directly or indirectly modify riffle beetle habitats.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—CSRBs are cryptic and shelter among gravel or under rocks, and it is possible that individuals occur within the aquifer itself. Population estimates are not available. Counting the number of riffle beetles that may be present in ROWs, is impractical, if not impossible.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation

- Suitable Habitat is the area within 984 feet of a a spring outlet or associated spring run or lake or wellwith known occupancy by CSRB (i.e., an "Occupied Spring Feature" as defined in the Glossary to the HCP).

Optional Avoidance Measures

- Avoid surface or subsurface disturbances within Suitable Habitat.

Presence/Absence Surveys

- Presence/Absence Surveys are not applicable because all Suitable Habitat is either known to be, or assumed to be, occupied.

Specific Minimization Measures

- Erect erosion and sediment controls, such as silt fencing, at the boundary of the 50-foot avoidance zone around the Occupied Spring Feature that will remain in place for the duration of the construction and any post-construction restoration.
- Schedule grading and earthmoving operations to expose the smallest practical area for the shortest possible time.
- Implement a materials management plan to address the safe handling, storage, treatment, and/or disposal of materials brought into Suitable Habitat.
- Avoid application of pesticides and herbicides within Suitable Habitat.
- Embed environmental monitors with construction crews, during active construction, to ensure minimization measures are implemented as intended.
- As a General Minimization Measure for the HCP, LCRA TSC agreed to avoid disturbances within 50 feet of the spring outlet and associated spring run to the maximum extent possible.
- LCRA TSC has also agreed, as a General Minimization Measure, to avoid causing subsurface Disturbances to wetlands, riparian areas, and to aquatic habitats to the maximum extent practicable.
- Within Critical Habitat for this species, LCRA TSC will reclaim and restore the footprint of any existing Structure that is removed and not occupied by a replacement Structure. The reclamation/restoration will be to a condition substantially consistent with any immediately adjacent land cover, with a priority for matching natural cover types and native plants.

Existing Impacts

- Existing Impacts apply to Suitable Habitat that is coincident with impervious cover, developed cover, or manicured landscape cover (e.g., buildings, roads, sidewalks, lawns) (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on the CSRB in the context of an incidental take assessment).

Direct Habitat Modification

- Direct Habitat Modification is subsurface disturbance within Suitable Habitat.

Special Cases

- Covered Activities performed within Critical Habitat.
- Covered Activities performed within 50 feet of an Occupied or Assumed Occupied Spring Feature
- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Indirect Habitat Modification

- Indirect Habitat Modification is surface disturbance, limited to the addition of impervious cover (e.g., gravel placement for access roads or where surface grading is not necessary), within areas of Suitable Habitat not subject to Direct Habitat Modification.

Sources: BIO-WEST (2016); Bosse et al. (1988); Bowles et al. (2003); Brown (1987); Cooke (2012); Cooke et al. (2015); Gibson et al. (2008); Huston and Gibson (2015); USFWS (1997, 2007, 2012a, 2013); Zara Environmental (2015)

Enrollment Scenario	**Standard Mitigation Ratios**	**Mitigation Factors**		
		Existing Impact	**Relaxed Restrictions**	**Post-Enrollment Mitigation**
Suitable Habitat with Assumed Occupancy	**Direct: 5:1** **Indirect: 0.5:1**	Standard Mitigation Ratios minus 90%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%
Occupied Habitat with Demonstrated Occupancy	**N/A**	N/A	N/A	N/A
Special Cases	**Direct: 20:1** **Indirect: 1:1**	Standard Mitigation Ratios minus 90%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%

LCRA TSC-responsible Conservation Priorities and Crediting

LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion in Chapter 6.5.1 of the HCP. LCRA TSC anticipates that Mitigation for impacts to Suitable Habitat can be satisfied with the protection and management of undeveloped acres within the range of the associated Covered Species. LCRA TSC will prioritize available opportunities in the following manner: 1) lands within 984 feet of an Occupied Spring Feature; 2) lands within the spring shed of the Occupied Spring Feature or Assumed Occupied Spring Feature; 3) lands within the spring shed of another known Occupied Spring Feature for that Covered Species; 4) lands within the range of the associated Covered Species; and 5) lands within the recharge zone of the segment of the Edwards Aquifer that contains the Occupied Spring Feature or Assumed Occupied Spring Feature. LCRA TSC will prioritize mitigation within 984 feet of an occupied spring feature for habitat modification that occurs within 984 feet of an occupied spring feature. Anticipated crediting, subject to modifications as described in Chapter 6.5.2: 1) 1 acre of protection and management within the spring shed of the impacted Occupied Spring Feature or within the spring shed of another such feature for that Covered Species = 1 credit; 2) 1 acre of protection and management within the general range of that Covered Species = 0.5 credit; 3) 1 acre of protection and management within the general recharge zone for that Covered Species = 0.1 credit. Management actions should improve the condition of the spring run (i.e., promote shading) or be designed to improve recharge.

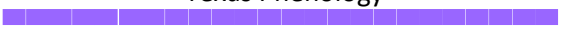
Peck's Cave Amphipod

Stygobromus pecki (PCAM)

Ecology

- An aquatic amphipod (Crustacean) that is known only to occur at Comal Springs complex and Hueco Springs; both associated with the Edwards Aquifer
- Species likely inhabits deep aquifer habitat
- Closely associated with spring outlets and seeps, where they are found underneath gravel, rocks, or other debris
- Presumed diet is of organic material growing on karst substrates (i.e., microbial colonies) and other organic debris (e.g., leaves, roots, invertebrate corpses, etc.) washed into their habitat
- Species remains extant at Comal Springs despite a period of 5 months of no spring flow due to severe drought conditions; species possibly survived by retreating into the aquifer

Texas Phenology



Potential Habitat

Only known to be associated within or adjacent to the Comal Springs complex and Hueco Springs. The following potential habitat is approximated by the subsurface extent of Critical Habitat designated for the species.

- Potential Habitat in Plan Area: 138 acres
- Potential Habitat in Range: 138 acres

Population

No population estimates are available for this species; however, the species is considered stable.

- Population in Plan Area: unknown
- Population in Range: unknown

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Clearing trees from riparian areas could alter the temperature of surface water habitat and degrade habitat quality at spring runs. Soil disturbance along occupied spring runs could introduce sediment to the aquatic habitat and degrade habitat quality. Subsurface excavations, particularly for transmission tower footings, could intercept or alter groundwater flow paths and cause the loss of habitat (USFWS 1997).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—Covered Activities will largely avoid surface aquatic habitats and are unlikely to fragment or introduce edge effects to PCAM habitat.
3. COLLISION—Collisions of LCRA TSC machinery or equipment with PCAM are not expected.
4. HERBICIDES—Direct toxicity of applied herbicides to individual PCAM or the biofilms eaten by the species is possible (USFWS 1997).
5. NOISE AND ACTIVITY DISTURBANCE—No published information suggests that PCAM are disturbed by noise or human activity.
6. PREDATOR/PREY CHANGES—The Covered Activities are unlikely to significantly alter prey or predator populations because LCRA TSC is expected to avoid altering surface aquatic environments by spanning such areas.

Surrogate Test

1. CAUSAL LINK—Take in the form of harm that may arise from habitat loss and degradation are related to aspects of the Covered Activities that directly or indirectly modify habitat.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—PCAMs are cryptic and shelter among gravel or under rocks, and it is likely that individuals occur within the aquifer itself. Population estimates are not available. Counting the number of PCAM that may be present in ROWs, is impractical, if not impossible.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation

- Suitable Habitat is the area within 984 feet of a a spring outlet or associated spring run or lake or wellwith known occupancy by PCAM (i.e., an "Occupied Spring Feature" as defined in the Glossary to the HCP).

Optional Avoidance Measures

- Avoid surface or subsurface disturbances within Suitable Habitat.

Presence/Absence Surveys

- Presence/Absence Surveys are not applicable because all Suitable Habitat is either known to be, or assumed to be, occupied.

Specific Minimization Measures

- Erect erosion and sediment controls, such as silt fencing, at the boundary of the 50-foot avoidance zone around the Occupied Spring Feature that will remain in place for the duration of the construction and any post-construction restoration.
- Schedule grading and earthmoving operations to expose the smallest practical area for the shortest possible time.
- Implement a materials management plan to address the safe handling, storage, treatment, and/or disposal of materials brought into Suitable Habitat.
- Avoid application of pesticides and herbicides within Suitable Habitat.
- Embed environmental monitors with construction crews, during active construction, to ensure minimization measures are implemented as intended.
- As a General Minimization Measure for the HCP, LCRA TSC agreed to avoid disturbances within 50 feet of the spring outlet and associated spring run to the maximum extent possible.
- LCRA TSC has also agreed, as a General Minimization Measure, to avoid causing subsurface Disturbances to wetlands, riparian areas, and to aquatic habitats to the maximum extent practicable.
- Within Critical Habitat for this species, LCRA TSC will reclaim and restore the footprint of any existing Structure that is removed and not occupied by a replacement Structure. The reclamation/restoration will be to a condition substantially consistent with any immediately adjacent land cover, with a priority for matching natural cover types and native plants.

Existing Impacts

- Existing Impacts apply to Suitable Habitat that is coincident with impervious cover, developed cover, or manicured landscape cover (e.g., buildings, roads, sidewalks, lawns) (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on the PCAM in the context of an incidental take assessment).

Direct Habitat Modification

- Direct Habitat Modification is subsurface disturbance within Suitable Habitat.

Special Cases

- Covered Activities performed within Critical Habitat.
- Covered Activities performed within 50 feet of an Occupied or Assumed Occupied Spring Feature.
- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Indirect Habitat Modification

- Indirect Habitat Modification is surface disturbance, limited to the addition of impervious cover (e.g., gravel placement for access roads or where surface grading is not necessary), within areas of Suitable Habitat not subject to Direct Habitat Modification.

Enrollment Scenario	Standard Mitigation Ratios	Mitigation Factors		
		Existing Impact	Relaxed Restrictions	Post-Enrollment Mitigation
Suitable Habitat with Assumed Occupancy	**Direct: 5:1** **Indirect: 0.5:1**	Standard Mitigation Ratios minus 90%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%
Occupied Habitat with Demonstrated Occupancy	**N/A**	N/A	N/A	N/A
Special Cases	**Direct: 20:1** **Indirect: 1:1**	Standard Mitigation Ratios minus 90%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%

LCRA TSC-responsible Conservation Priorities and Crediting

LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion in Chapter 6.5.1 of the HCP. LCRA TSC anticipates that Mitigation for impacts to Suitable Habitat can be satisfied with the protection and management of undeveloped acres within the range of the associated Covered Species. LCRA TSC will prioritize available opportunities in the following manner: 1) lands within 984 feet of an Occupied Spring Feature; 2) lands within the spring shed of the Occupied Spring Feature or Assumed Occupied Spring Feature; 3) lands within the spring shed of another known Occupied Spring Feature for that Covered Species; 4) lands within the range of the associated Covered Species; and 5) lands within the recharge zone of

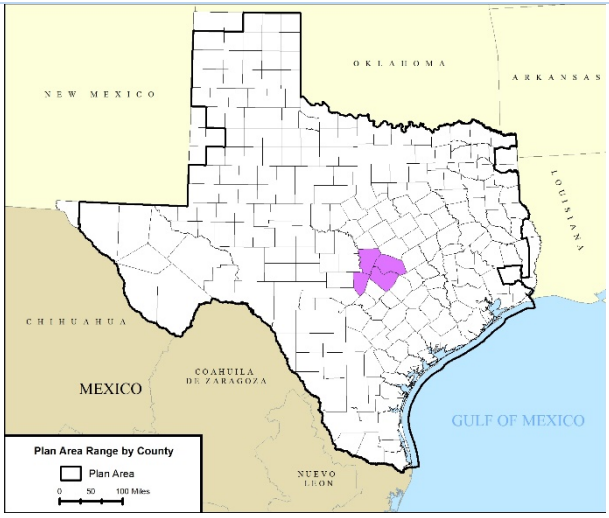
the segment of the Edwards Aquifer that contains the Occupied Spring Feature or Assumed Occupied Spring Feature. LCRA TSC will prioritize mitigation within 984 feet of an occupied spring feature for habitat modification that occurs within 984 feet of an occupied spring feature. Anticipated crediting, subject to modifications as described in Chapter 6.5.2: 1) 1 acre of protection and management within the spring shed of the impacted Occupied Spring Feature or within the spring shed of another such feature for that Covered Species = 1 credit; 2) 1 acre of protection and management within the general range of that Covered Species = 0.5 credit; 3) 1 acre of protection and management within the general recharge zone for that Covered Species = 0.1 credit. Management actions should improve the condition of the spring run (i.e., promote shading) or be designed to improve recharge.

Northern Karst Invertebrates (NKIN)

Bee Creek Cave Harvestman (*Texella reddelli*), Tooth Cave Spider (*Tayshaneta* [syn. *Neoleptoneta*] *myopica*), Tooth Cave Ground Beetle (*Rhadine persephone*)

Ecology

- Very small, mostly blind, cryptic group that live underground in karst voids
- Few details regarding the life history and ecology of these species are known, due largely to the inaccessibility of their habitat
- Thought to be predatory on microarthropods, but some may scavenge cave cricket eggs
- Rhadine beetles are known to cruise across the floor and walls of void passages, whereas most of the other species are typically found under rocks or other cover objects
- Surface communities provide important nutrient inputs and moderate the physical environment karst habitat



Texas Phenology

Potential Habitat

NKIN occur in caves, other karst voids, and mesocavernous spaces in limestone karst formations with stable temperatures and high humidity. The following acres of potential habitat for the NKIN group are approximated by the area of Karst Zones 1 and 2 mapped in Travis and Williamson Counties. See SWCA (2018) for species-specific habitat estimates based on known range.

- Potential Habitat in Plan Area: 182,735 acres
- Potential Habitat in Range: 182,735 acres

Population

No population estimates are available for any of these species.

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Covered Activities involving excavation can result in the permanent loss of habitable karst voids. Clearing trees from ROW can degrade karst habitat by altering the amount or composition of nutrient inputs to the subsurface environment or altering the subsurface climate through additional sun exposure at the ground surface (USFWS 2011, 2018).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—Covered Activities involving excavation can fragment previously connected subsurface voids, disrupting the movement of individual NKINs or the flow of air, moisture, and nutrients used by these species. Temporary edge effects are possible when karst voids adjacent to excavated areas are open to the surface climate, thereby changing the temperature and moisture regime of the adjacent voids for an unknown distance (USFWS 2011, 2018). Edge effects would likely be temporary and cease once excavated areas were backfilled and no longer directly exposed to the surface.
3. COLLISION—Equipment or rubble may collide with and kill or wound an individual NKIN, if an individual is present in a void during excavation of the surrounding karst matrix (USFWS 2011, 2018).
4. HERBICIDES—Direct toxicity of applied herbicides to individual NKIN or their prey is possible (USFWS 2011, 2018).
5. NOISE AND ACTIVITY DISTURBANCE—No published information suggests that NKIN are disturbed by noise or human activity.
6. PREDATOR/PREY CHANGES—Vegetation and soil disturbances associated with the Covered Activities can facilitate the invasion or proliferation of red imported fire ants, which the USFWS (2011, 2018) identifies as a threat to endangered karst fauna via predation or competition.

Surrogate Test

1. CAUSAL LINK—Take that may arise from habitat loss and degradation, habitat fragmentation and edge effects, collisions with equipment, direct toxicity from legally applied herbicides, and altered prey communities are all related to aspects of the Covered Activities that modify NKIN habitats directly in the subsurface or indirectly at the surface.
2. COUNT OF INDIVIDUALS NOT PRACTICAL—It is impractical, and perhaps impossible, to establish the number and/or specific identity of the individuals of any particular listed species likely to be taken by the Covered Activities. The difficulties in making these determinations are related to the inaccessible nature of the habitat, the cryptic nature of the individuals themselves, and uncertainties about the basic taxonomic identity of several species of karst fauna.
3. CLEAR STANDARD FOR EXCEEDANCE—Acres of Direct and Indirect Habitat Modification can be precisely measured during and after conduct of the Covered Activity and compared to authorized limits.

Habitat Delineation

- Suitable Habitat for each Covered Species in this group is the area of Karst Zone 1 or 2 that occurs within the range of that species, as defined by the boundaries of the Karst Fauna Regions in which it is known to occur (if applicable) or other delineation of its known range (see SWCA 2018).
- Suitable Habitat excludes areas of karst matrix previously subject to excavation and backfill.

Optional Avoidance Measures

- Avoid Covered Activities in Suitable Habitat.

Presence/Absence Surveys

- Phase 1 Karst Feature Surveys (REQUIRED) – Will follow protocol recommendations in USFWS (2015), or may be revised in the future, for the identification of karst features that may contain karst invertebrate habitat (i.e., generally, steps 1 through 3) to areas of Suitable Habitat (i.e., Karst Zones 1 or 2).
  - Karst features that may contain karst invertebrate habitat can be addressed in the HCP with an assumption of occupancy without further investigation (Assumed Occupied Karst Feature – use the "Occupied Habitat with Demonstrated Occupancy" Enrollment Scenario) OR proceed to Phase 2.
- Phase 2 Feature Investigations (OPTIONAL) – Will follow protocol recommendations in USFWS (2015), or may be revised in the future, for additional investigations of karst features to either remove the feature from consideration (i.e., upon excavation, the feature does not contain karst invertebrate habitat; step 4) or conduct karst invertebrate surveys to determine actual presence or likely absence of individual Covered Species (step 5).
  - For each Covered Species detected within the karst feature, the feature becomes an "Occupied Karst Feature" – use the "Occupied Habitat with Demonstrated Occupancy" Enrollment Scenario.
  - For any Covered Species not detected within the karst feature, the feature is treated as if it were Suitable Habitat (i.e., general areas of Karst Zone 1 or 2).
- The limit of an Occupied Karst Feature or Assumed Occupied Karst Feature is the area within 345 feet of the feature entrance or (if known) the feature footprint. As a General Minimization Measure, LCRA TSC agreed to avoid disturbances within 50 feet of a feature entrance or footprint.
- For the purposes of applying the mitigation matrix below, Occupied Habitat is the area associated with an Occupied Karst Feature or Assumed Occupied Karst Feature.
- Given the potential for encountering voids largely undetectable from the surface, "Unoccupied Habitat" does not apply to this group of Covered Species.

Specific Minimization Measures

- Apply and monitor erosion and sediment control best management practices before, during, and after construction to prevent sediment from flowing into Occupied Habitat (i.e., Occupied Karst Features or Assumed Occupied Karst Features).
- Schedule grading and earthmoving operations to expose the smallest practical area for the shortest possible time.
- Implement a materials management plan to address the safe handling, storage, treatment, and/or disposal of materials brought into Suitable or Occupied Habitat.
- Avoid application of pesticides and herbicides within Suitable or Occupied Habitat.

Existing Impacts

- Existing Impacts are areas with prior subsurface disturbance (i.e., surface grading; previously excavated areas are not Suitable Habitat) or the addition of impervious cover (i.e., any land use or prior disturbance for which the USFWS would typically consider as creating an indirect habitat modification on these species in the context of an incidental take assessment).

Direct Habitat Modification

- Direct Habitat Modification is subsurface disturbance within Suitable Habitat or Occupied Habitat.

Special Cases

- Covered Activities performed within 50 feet of an Occupied Feature or Assumed Occupied Feature, applicable only to features allowed to be "completely taken" by participation in another existing programmatic HCP.
- Covered Activities involving New Construction and affecting certain conservation lands under certain conditions, as described in Chapter 6.6.7.

Indirect Habitat Modification

- Indirect Habitat Modification is surface disturbance, limited to the removal of woody canopy (i.e., tree or shrub cover) within areas of Suitable Habitat or Occupied Habitat not subject to Direct Habitat Modification.

Sources: G. Veni & Associates (1992); SWCA 2018; USFWS (1994, 2009a, 2009b, 2011, 2015, 2018); Veni and Martinez (2007)

Enrollment Scenario	Standard Mitigation Ratios	Mitigation Factors		
		Existing Impact	Relaxed Restrictions	Post-Enrollment Mitigation
Suitable Habitat or Unoccupied Habitat	**Direct: 0.25:1** **Indirect: 0.1:1**	Standard Mitigation Ratios minus 50%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%
Occupied Habitat with Known or Assumed Occupancy	**Direct: 10:1** **Indirect: 1:1**	Standard Mitigation Ratios minus 50%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%
Special Cases	**Direct: 20:1** **Indirect: 2:1**	Standard Mitigation Ratios minus 50%	Standard Mitigation Ratio plus 100%	Standard Mitigation Ratio plus 25%

LCRA TSC-responsible Conservation Priorities and Crediting

LCRA TSC will prioritize conservation actions in the order listed in Chapter 6.5.2 of the HCP, with expectations for crediting of such actions consistent with the discussion in Chapter 6.5.1 of the HCP. LCRA TSC will first prioritize mitigation opportunities that contribute to the creation of a karst fauna area, subject to the availability of practicable mitigation opportunities, and if not practicable, then other opportunities may be evaluated. Mitigation for impacts to Suitable Habitat (i.e., general Karst Zone 1 or 2) can be satisfied with the protection and management of undeveloped acres over Karst Zone 1 or 2. No demonstration of occupancy is needed. One acre of protection and management = 1 credit. Mitigation for impacts within Occupied Habitat that is not otherwise stacked with mitigation fees paid to a regional HCP will to extent practicable be the protection and management of land that is within 1,200 feet of a known Occupied Karst Feature (1,200 feet is approximately the diameter of a 100-acre circle, the recommended size of a high-quality karst fauna area) or that otherwise contributes to the creation or expansion of a karst fauna area.

Note on Standard Mitigation Ratios

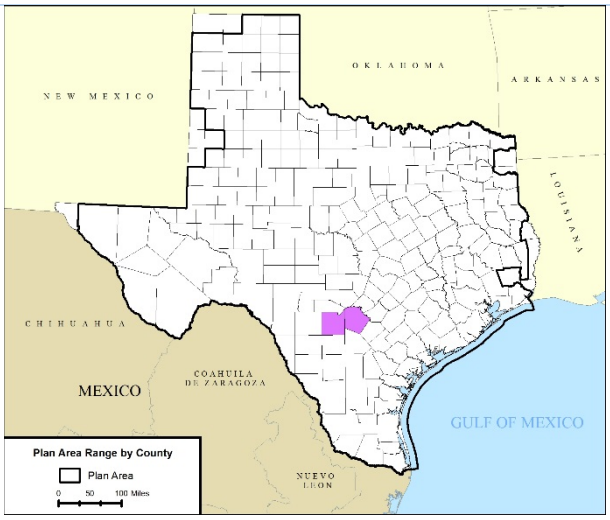
Standard Mitigation Ratios are roughly consistent with the participation fees charged by the Williamson County Regional HCP and the Southern Edwards Plateau HCP, both approved by the USFWS and address similar types of habitat modifications (i.e., modifications to general Karst Zone habitat and modifications to areas adjacent to features known to be occupied by listed karst invertebrates). For instance, the Williamson County Regional HCP charges $100/acre of disturbance to Karst Zone habitat and the Southern Edwards Plateau HCP charges $1,000/acre of disturbance to Karst Zone habitat. Similarly, the Williamson County Regional HCP charges $10,000/acre of disturbance within the zone between 50 and 345 feet of an occupied karst feature and the Southern Edwards Plateau HCP charges $40,000/acre of disturbance within the zone between 345 and 750 feet of an occupied karst feature. Based on these two examples, the mean fee for disturbances to general Karst Zones is $550/acre and the mean fee for disturbances at the outer zone of an occupied karst feature is $25,000. The average per-acre rural land value for Burnet, Williamson, and Medina Counties (i.e., those where take authorized under this HCP is most likely to occur) is $5,000 (see Appendix H of the HCP). Therefore, a mitigation ratio that would generate an obligation similar to the mean fees of the existing programmatic HCPs is approximately 0.1 : 1 for Suitable Habitat with Assumed Occupancy (i.e., the $500/acre mean fee is approximately 10% of the average per-acre rural land value) and approximately 5 : 1 for the outer zone of Occupied Habitat (i.e., the $25,000/acre mean fee is approximately 5× the average per-acre rural land value). Using a similar comparison, the proposed 20 : 1 Standard Mitigation Ratio for Special Cases is generally equivalent to $100,000/acre of disturbance.

Southern Karst Invertebrates (SKIN)

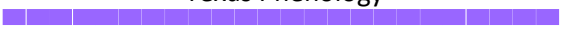
Government Canyon Bat Cave spider (*Tayshaneta microps*), Helotes mold beetle (*Batrisodes venyivi*), Madla's Cave meshweaver (*Cicurina madla*), *Rhadine exilis* (no common name), *Rhadine infernalis* (no common name)

Ecology

- Very small, blind, cryptic group that live underground in karst voids
- Thought to be predatory on microarthropods, but some may scavenge cave cricket eggs
- Rhadine beetles are known to cruise across the floor and walls of void passages, whereas most of the other species are typically found under rocks or other cover objects
- Surface communities provide important nutrient inputs and moderate the physical environment karst habitat



Texas Phenology



Potential Habitat

SKIN occur in caves, other karst voids, and mesocavernous spaces in limestone karst formations with stable temperatures and high humidity. The following acres of potential habitat for the SKIN group are approximated by the area of Karst Zones 1 and 2 located within Medina County, Texas. See SWCA (2018) for species-specific habitat estimates based on known range.

- Potential Habitat in Plan Area: 20,162 acres in Medina County
- Potential Habitat in Range: 138,640 acres

Population

No population estimates are available for any of these species.

Potential Effects of the Covered Activities

1. HABITAT LOSS AND DEGRADATION—Covered Activities involving excavation can result in the permanent loss of habitable karst voids. Clearing trees from ROW can degrade karst habitat by altering the amount or composition of nutrient inputs to the subsurface environment or altering the subsurface climate through additional sun exposure at the ground surface (USFWS 2011).
2. HABITAT FRAGMENTATION AND EDGE EFFECTS—Covered Activities involving excavation can fragment previously connected subsurface voids, disrupting the movement of individual SKINs or the flow of air, moisture, and nutrients used by these species. Temporary edge effects are possible when karst voids adjacent to excavated areas are open to the surface climate, thereby changing the temperature and moisture regime of the adjacent voids for an unknown distance (USFWS 2011). Edge effects would likely be temporary and cease once excavated areas were backfilled and no longer directly exposed to the surface.
3. COLLISION—Equipment or rubble may collide with and kill or wound an individual SKIN, if an individual is present in a void during excavation of the surrounding karst matrix (USFWS 2011)
4. HERBICIDES—Direct toxicity of applied herbicides to individual SKIN or their prey is possible (USFWS 2011).
5. NOISE AND ACTIVITY DISTURBANCE—No published information suggests that SKIN are disturbed by noise or human activity.
6. PREDATOR/PREY CHANGES—Vegetation and soil disturbances associated with the Covered Activities can facilitate the invasion or proliferation of red imported fire ants, which USFWS (2011) identifies as a threat to endangered karst fauna via predation or competition.

Surrogate Test

1. CAUSAL LINK—Take that may arise from habitat loss and degradation, habitat fragmentation and edge effects, collisions with equipment, direct toxicity from legally applied herbicides, and altered prey communities are all related to aspects of the Covered Activities that modify NKIN habitats directly in the subsurface or indirectly at the surface.
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- Suitable Habitat excludes areas of karst matrix previously subject to excavation and backfill.
- Suitable Habitat for the purpose of this HCP is limited to Medina County.

Optional Avoidance Measures

- Avoid Covered Activities in Suitable Habitat.

Presence/Absence Surveys

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APPENDIX E

County-Level Distribution of Potential Habitats for Covered Species

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Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Golden-cheeked Warbler *Texas A&M Institute of Renewable Natural Resources (TAMU IRNR) Habitat Model (Morrison et al. 2010).*	Whooping Crane *Winter habitat (land covers not including urban, woodland, forest, shrubland, or open water) within the Mid-coast Barrier Islands and Coastal Marshes Level IV Ecoregion between Aransas Pass and the Colorado River.*	Piping Plover *Texas Ecological Systems Database (TXESD) vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Rufa Red Knot *TXESD vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Red-cockaded Woodpecker *2011 NLCD Land Cover class for Evergreen Forest within range of the species.*	Ocelot *Estimated from Texas Ecological Systems Database (TXESD) vegetation classes that include a thornscrub component and that have at least 50% canopy cover, as estimated by the 2011 National Land Cover Dataset canopy cover layer.*	Spot-tailed Earless Lizard *Estimated from habitat model maps in Pierre et al. (2017) for high and low suitability of potential habitat within the current known range of the species.*	Houston Toad *Estimated from simple habitat model in Buzo (2008) for High and Medium Likelihood classes.*	Barton Springs Salamander *Estimated by applying a 984-foot zone around all known localities described by Devitt and Nissen (2018) as pertaining to the Barton Springs salamander.*	Georgetown Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*
Anderson	0	0	0	0	0	0	0	0	0	0
Andrews	0	0	0	0	0	0	0	0	0	0
Angelina	0	0	0	0	141,219	0	0	0	0	0
Aransas	0	94,356	7,927	7,927	0	0	0	0	0	0
Archer	0	0	0	0	0	0	0	0	0	0
Armstrong	0	0	0	0	0	0	0	0	0	0
Atascosa	0	0	0	0	0	0	0	0	0	0
Austin	0	0	0	0	0	0	0	50,595	0	0
Bandera	230,467	0	0	0	0	0	0	0	0	0
Bastrop	0	0	0	0	0	0	0	211,842	0	0
Baylor	0	0	0	0	0	0	0	0	0	0
Bee	0	0	0	0	0	0	0	0	0	0
Bell	95,662	0	0	0	0	0	0	0	0	0
Bexar	97,481	0	0	0	0	0	0	0	0	0
Blanco	123,033	0	0	0	0	0	0	0	0	0
Borden	0	0	0	0	0	0	0	0	0	0
Bosque	133,592	0	0	0	0	0	0	0	0	0
Bowie	0	0	0	0	0	0	0	0	0	0
Brazoria	0	0	974	974	0	0	0	0	0	0
Brazos	0	0	0	0	0	0	0	0	0	0
Brewster	0	0	0	0	0	0	0	0	0	0
Briscoe	0	0	0	0	0	0	0	0	0	0
Brooks	0	0	0	0	0	0	0	0	0	0
Brown	0	0	0	0	0	0	0	0	0	0
Burleson	0	0	0	0	0	0	0	73,650	0	0
Burnet	228,773	0	0	0	0	0	0	0	0	0
Caldwell	0	0	0	0	0	0	0	0	0	0
Calhoun	0	146,125	1,732	1,732	0	0	0	0	0	0
Callahan	0	0	0	0	0	0	0	0	0	0
Cameron	0	0	48,078	48,078	0	26,096	0	0	0	0
Camp	0	0	0	0	0	0	0	0	0	0
Carson	0	0	0	0	0	0	0	0	0	0
Castro	0	0	0	0	0	0	0	0	0	0
Chambers	0	0	34	34	0	0	0	0	0	0
Cherokee	0	0	0	0	140,303	0	0	0	0	0
Childress	0	0	0	0	0	0	0	0	0	0
Clay	0	0	0	0	0	0	0	0	0	0
Coke	0	0	0	0	0	0	403,093	0	0	0
Coleman	0	0	0	0	0	0	0	0	0	0
Collin	0	0	0	0	0	0	0	0	0	0
Collingsworth	0	0	0	0	0	0	0	0	0	0
Colorado	0	0	0	0	0	0	0	112,128	0	0
Comal	154,254	0	0	0	0	0	0	0	0	0
Comanche	60	0	0	0	0	0	0	0	0	0
Concho	0	0	0	0	0	0	354,207	0	0	0
Cooke	0	0	0	0	0	0	0	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Golden-cheeked Warbler *Texas A&M Institute of Renewable Natural Resources (TAMU IRNR) Habitat Model (Morrison et al. 2010).*	Whooping Crane *Winter habitat (land covers not including urban, woodland, forest, shrubland, or open water) within the Mid-coast Barrier Islands and Coastal Marshes Level IV Ecoregion between Aransas Pass and the Colorado River.*	Piping Plover *Texas Ecological Systems Database (TXESD) vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Rufa Red Knot *TXESD vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Red-cockaded Woodpecker *2011 NLCD Land Cover class for Evergreen Forest within range of the species.*	Ocelot *Estimated from Texas Ecological Systems Database (TXESD) vegetation classes that include a thornscrub component and that have at least 50% canopy cover, as estimated by the 2011 National Land Cover Dataset canopy cover layer.*	Spot-tailed Earless Lizard *Estimated from habitat model maps in Pierre et al. (2017) for high and low suitability of potential habitat within the current known range of the species.*	Houston Toad *Estimated from simple habitat model in Buzo (2008) for High and Medium Likelihood classes.*	Barton Springs Salamander *Estimated by applying a 984-foot zone around all known localities described by Devitt and Nissen (2018) as pertaining to the Barton Springs salamander.*	Georgetown Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*
Coryell	140,691	0	0	0	0	0	0	0	0	0
Cottle	0	0	0	0	0	0	0	0	0	0
Crane	0	0	0	0	0	0	0	0	0	0
Crockett	0	0	0	0	0	0	810,157	0	0	0
Crosby	0	0	0	0	0	0	0	0	0	0
Culberson	0	0	0	0	0	0	0	0	0	0
Dallas	0	0	0	0	0	0	0	0	0	0
Dawson	0	0	0	0	0	0	0	0	0	0
De Witt	0	0	0	0	0	0	0	0	0	0
Deaf Smith	0	0	0	0	0	0	0	0	0	0
Delta	0	0	0	0	0	0	0	0	0	0
Denton	0	0	0	0	0	0	0	0	0	0
Dickens	0	0	0	0	0	0	0	0	0	0
Dimmit	0	0	0	0	0	0	0	0	0	0
Donley	0	0	0	0	0	0	0	0	0	0
Duval	0	0	0	0	0	0	0	0	0	0
Eastland	45,289	0	0	0	0	0	0	0	0	0
Ector	0	0	0	0	0	0	0	0	0	0
Edwards	248,995	0	0	0	0	0	591,987	0	0	0
Ellis	0	0	0	0	0	0	0	0	0	0
Erath	117,839	0	0	0	0	0	0	0	0	0
Falls	0	0	0	0	0	0	0	0	0	0
Fannin	0	0	0	0	0	0	0	0	0	0
Fayette	0	0	0	0	0	0	0	0	0	0
Fisher	0	0	0	0	0	0	0	0	0	0
Floyd	0	0	0	0	0	0	0	0	0	0
Foard	0	0	0	0	0	0	0	0	0	0
Fort Bend	0	0	0	0	0	0	0	0	0	0
Franklin	0	0	0	0	0	0	0	0	0	0
Freestone	0	0	0	0	0	0	0	0	0	0
Frio	0	0	0	0	0	0	0	0	0	0
Gaines	0	0	0	0	0	0	0	0	0	0
Galveston	0	0	1,605	1,605	0	0	0	0	0	0
Garza	0	0	0	0	0	0	0	0	0	0
Gillespie	155,899	0	0	0	0	0	0	0	0	0
Glasscock	0	0	0	0	0	0	350,545	0	0	0
Goliad	0	0	0	0	0	0	0	0	0	0
Gonzales	0	0	0	0	0	0	0	0	0	0
Gray	0	0	0	0	0	0	0	0	0	0
Grayson	0	0	0	0	0	0	0	0	0	0
Gregg	0	0	0	0	0	0	0	0	0	0
Grimes	0	0	0	0	0	0	0	0	0	0
Guadalupe	0	0	0	0	0	0	0	0	0	0
Hale	0	0	0	0	0	0	0	0	0	0
Hall	0	0	0	0	0	0	0	0	0	0
Hamilton	68,044	0	0	0	0	0	0	0	0	0

Data in acres, rounded to the nearest whole number

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Hansford	0	0	0	0	0	0	0	0	0	0
Hardeman	0	0	0	0	0	0	0	0	0	0
Harris	0	0	0	0	0	0	0	0	0	0
Harrison	0	0	0	0	0	0	0	0	0	0
Hartley	0	0	0	0	0	0	0	0	0	0
Haskell	0	0	0	0	0	0	0	0	0	0
Hays	161,342	0	0	0	0	0	0	0	558	0
Hemphill	0	0	0	0	0	0	0	0	0	0
Henderson	0	0	0	0	0	0	0	0	0	0
Hidalgo	0	0	0	0	0	0	0	0	0	0
Hill	15,579	0	0	0	0	0	0	0	0	0
Hood	42,656	0	0	0	0	0	0	0	0	0
Hopkins	0	0	0	0	0	0	0	0	0	0
Houston	0	0	0	0	192,220	0	0	0	0	0
Howard	0	0	0	0	0	0	0	0	0	0
Hudspeth	0	0	0	0	0	0	0	0	0	0
Hunt	0	0	0	0	0	0	0	0	0	0
Hutchinson	0	0	0	0	0	0	0	0	0	0
Irion	0	0	0	0	0	0	299,446	0	0	0
Jack	11	0	0	0	0	0	0	0	0	0
Jackson	0	24,092	0	0	0	0	0	0	0	0
Jasper	0	0	0	0	179,833	0	0	0	0	0
Jeff Davis	0	0	0	0	0	0	0	0	0	0
Jefferson	0	0	645	645	0	0	0	0	0	0
Jim Hogg	0	0	0	0	0	0	0	0	0	0
Jim Wells	0	0	0	0	0	0	124,786	0	0	0
Johnson	19,208	0	0	0	0	0	0	0	0	0
Jones	0	0	0	0	0	0	0	0	0	0
Karnes	0	0	0	0	0	0	0	0	0	0
Kaufman	0	0	0	0	0	0	0	0	0	0
Kendall	134,172	0	0	0	0	0	0	0	0	0
Kenedy	0	0	129,875	129,875	0	26,096	0	0	0	0
Kent	0	0	0	0	0	0	0	0	0	0
Kerr	248,172	0	0	0	0	0	355,049	0	0	0
Kimble	183,174	0	0	0	0	0	0	0	0	0
King	0	0	0	0	0	0	0	0	0	0
Kinney	40,923	0	0	0	0	0	526,278	0	0	0
Kleberg	0	0	7,223	7,223	0	0	0	0	0	0
Knox	0	0	0	0	0	0	0	0	0	0
La Salle	0	0	0	0	0	0	0	0	0	0
Lamar	0	0	0	0	0	0	0	0	0	0
Lamb	0	0	0	0	0	0	0	0	0	0
Lampasas	93,149	0	0	0	0	0	0	0	0	0
Lavaca	0	0	0	0	0	0	0	186,213	0	0
Lee	0	0	0	0	0	0	0	133,513	0	0
Leon	0	0	0	0	0	0	0	110,419	0	0

Data in acres, rounded to the nearest whole number

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Liberty	0	0	0	0	58,777	0	0	0	0	0
Limestone	0	0	0	0	0	0	0	0	0	0
Lipscomb	0	0	0	0	0	0	0	0	0	0
Live Oak	0	0	0	0	0	0	0	0	0	0
Llano	103,641	0	0	0	0	0	0	0	0	0
Loving	0	0	0	0	0	0	0	0	0	0
Lubbock	0	0	0	0	0	0	0	0	0	0
Lynn	0	0	0	0	0	0	0	0	0	0
Madison	0	0	0	0	0	0	0	0	0	0
Martin	0	0	0	0	0	0	0	0	0	0
Mason	91,991	0	0	0	0	0	541,795	0	0	0
Matagorda	0	59,034	2,302	2,302	0	0	0	0	0	0
Maverick	0	0	0	0	0	0	681,942	0	0	0
Mcculloch	24	0	0	0	0	0	491,634	0	0	0
Mclennan	19,497	0	0	0	0	0	0	0	0	0
Mcmullen	0	0	0	0	0	0	0	0	0	0
Medina	123,006	0	0	0	0	0	0	0	0	0
Menard	18,938	0	0	0	0	0	0	0	0	0
Midland	0	0	0	0	0	0	0	0	0	0
Milam	0	0	0	0	0	0	0	182,790	0	0
Mills	18	0	0	0	0	0	0	0	0	0
Mitchell	0	0	0	0	0	0	0	0	0	0
Montague	0	0	0	0	0	0	0	0	0	0
Montgomery	0	0	0	0	130,577	0	0	0	0	0
Moore	0	0	0	0	0	0	0	0	0	0
Morris	0	0	0	0	0	0	0	0	0	0
Motley	0	0	0	0	0	0	0	0	0	0
Nacogdoches	0	0	0	0	142,600	0	0	0	0	0
Navarro	0	0	0	0	0	0	0	0	0	0
Nolan	0	0	0	0	0	0	0	0	0	0
Nueces	0	3,161	3,972	3,972	0	0	307,231	0	0	0
Ochiltree	0	0	0	0	0	0	0	0	0	0
Oldham	0	0	0	0	0	0	0	0	0	0
Palo Pinto	177,927	0	0	0	0	0	0	0	0	0
Panola	0	0	0	0	0	0	0	0	0	0
Parker	0	0	0	0	0	0	0	0	0	0
Parmer	0	0	0	0	0	0	0	0	0	0
Pecos	0	0	0	0	0	0	0	0	0	0
Polk	0	0	0	0	226,054	0	0	0	0	0
Potter	0	0	0	0	0	0	0	0	0	0
Presidio	0	0	0	0	0	0	0	0	0	0
Rains	0	0	0	0	0	0	0	0	0	0
Randall	0	0	0	0	0	0	0	0	0	0
Reagan	0	0	0	0	0	0	413,491	0	0	0
Real	220,281	0	0	0	0	0	310,826	0	0	0
Red River	0	0	0	0	0	0	0	0	0	0

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Reeves	0	0	0	0	0	0	0	0	0	0
Refugio	0	27,640	0	0	0	0	0	0	0	0
Roberts	0	0	0	0	0	0	0	0	0	0
Robertson	0	0	0	0	0	0	0	177,129	0	0
Rockwall	0	0	0	0	0	0	0	0	0	0
Runnels	0	0	0	0	0	0	386,967	0	0	0
Rusk	0	0	0	0	0	0	0	0	0	0
San Augustine	0	0	0	0	126,723	0	0	0	0	0
San Jacinto	0	0	0	0	116,479	0	0	0	0	0
San Patricio	0	9,826	89	89	0	0	0	0	0	0
San Saba	127,069	0	0	0	0	0	0	0	0	0
Schleicher	2	0	0	0	0	0	482,536	0	0	0
Scurry	0	0	0	0	0	0	0	0	0	0
Shackelford	0	0	0	0	0	0	0	0	0	0
Shelby	0	0	0	0	136,034	0	0	0	0	0
Smith	0	0	0	0	0	0	0	0	0	0
Somervell	38,992	0	0	0	0	0	0	0	0	0
Starr	0	0	0	0	0	0	0	0	0	0
Stephens	57,884	0	0	0	0	0	0	0	0	0
Sterling	0	0	0	0	0	0	225,435	0	0	0
Stonewall	0	0	0	0	0	0	0	0	0	0
Sutton	20	0	0	0	0	0	407,509	0	0	0
Swisher	0	0	0	0	0	0	0	0	0	0
Tarrant	0	0	0	0	0	0	0	0	0	0
Taylor	0	0	0	0	0	0	0	0	0	0
Terrell	0	0	0	0	0	0	0	0	0	0
Terry	0	0	0	0	0	0	0	0	0	0
Throckmorton	0	0	0	0	0	0	0	0	0	0
Titus	0	0	0	0	0	0	0	0	0	0
Tom Green	0	0	0	0	0	0	523,235	0	0	0
Travis	150,610	0	0	0	0	0	0	0	419	0
Trinity	0	0	0	0	187,787	0	0	0	0	0
Tyler	0	0	0	0	183,477	0	0	0	0	0
Upshur	0	0	0	0	0	0	0	0	0	0
Upton	0	0	0	0	0	0	0	0	0	0
Uvalde	156,699	0	0	0	0	0	0	0	0	0
Val Verde	7	0	0	0	0	0	932,813	0	0	0
Van Zandt	0	0	0	0	0	0	0	0	0	0
Victoria	0	9,572	0	0	0	0	0	0	0	0
Walker	0	0	0	0	168,939	0	0	0	0	0
Waller	0	0	0	0	0	0	0	0	0	0
Ward	0	0	0	0	0	0	0	0	0	0
Washington	0	0	0	0	0	0	0	0	0	0
Webb	0	0	0	0	0	0	0	0	0	0
Wharton	0	0	0	0	0	0	0	0	0	0
Wheeler	0	0	0	0	0	0	0	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Golden-cheeked Warbler	Whooping Crane	Piping Plover	Rufa Red Knot	Red-cockaded Woodpecker	Ocelot	Spot-tailed Earless Lizard	Houston Toad	Barton Springs Salamander	Georgetown Salamander
	Texas A&M Institute of Renewable Natural Resources (TAMU IRNR) Habitat Model (Morrison et al. 2010).	*Winter habitat (land covers not including urban, woodland, forest, shrubland, or open water) within the Mid-coast Barrier Islands and Coastal Marshes Level IV Ecoregion between Aransas Pass and the Colorado River.*	*Texas Ecological Systems Database (TXESD) vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	*TXESD vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	*2011 NLCD Land Cover class for Evergreen Forest within range of the species.*	*Estimated from Texas Ecological Systems Database (TXESD) vegetation classes that include a thornscrub component and that have at least 50% canopy cover, as estimated by the 2011 National Land Cover Dataset canopy cover layer.*	*Estimated from habitat model maps in Pierre et al. (2017) for high and low suitability of potential habitat within the current known range of the species.*	*Estimated from simple habitat model in Buzo (2008) for High and Medium Likelihood classes.*	*Estimated by applying a 984-foot zone around all known localities described by Devitt and Nissen (2018) as pertaining to the Barton Springs salamander.*	*Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*
Wichita	0	0	0	0	0	0	0	0	0	0
Wilbarger	0	0	0	0	0	0	0	0	0	0
Willacy	0	0	39,295	39,295	0	26,096	0	0	0	0
Williamson	83,067	0	0	0	0	0	0	0	0	1,031
Wilson	0	0	0	0	0	0	0	0	0	0
Winkler	0	0	0	0	0	0	0	0	0	0
Wise	0	0	0	0	0	0	0	0	0	0
Wood	0	0	0	0	0	0	0	0	0	0
Young	11	0	0	0	0	0	0	0	0	0
Zapata	0	0	0	0	0	0	0	0	0	0
Zavala	0	0	0	0	0	0	0	0	0	0
TOTAL Plan Area	**4,148,149**	**373,806**	**243,751**	**243,751**	**2,131,022**	**78,288**	**9,520,962**	**1,238,279**	**977**	**1,031**

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Anderson	0	0	0	0	0	0	0	0	0	0
Andrews	0	0	0	0	0	0	0	0	0	0
Angelina	0	0	0	0	0	0	0	0	0	0
Aransas	0	0	0	0	0	0	0	0	0	0
Archer	0	0	0	0	0	0	0	0	0	0
Armstrong	0	0	0	0	0	0	0	0	0	0
Atascosa	0	0	0	0	0	0	0	0	0	0
Austin	0	0	0	0	0	0	0	0	0	0
Bandera	0	0	0	0	0	0	0	0	0	0
Bastrop	0	0	0	0	0	0	0	0	0	0
Baylor	0	0	0	0	0	0	0	0	0	0
Bee	0	0	0	0	0	0	0	0	0	0
Bell	0	372	0	0	0	0	0	0	0	0
Bexar	0	0	0	0	0	0	0	0	0	0
Blanco	0	0	0	0	0	3,363	0	0	0	0
Borden	0	0	0	0	0	0	0	0	0	0
Bosque	0	0	0	0	0	0	0	0	0	0
Bowie	0	0	0	0	0	0	0	0	0	0
Brazoria	0	0	0	0	0	0	0	0	0	0
Brazos	0	0	0	0	0	0	0	0	0	0
Brewster	0	0	0	0	0	0	0	0	0	0
Briscoe	0	0	0	0	0	0	0	0	0	0
Brooks	0	0	0	0	0	0	0	0	0	0
Brown	0	0	0	0	0	0	0	0	0	0
Burleson	0	0	0	0	0	0	0	0	0	0
Burnet	0	0	0	0	0	42,593	0	0	0	0
Caldwell	0	0	0	0	0	0	0	0	0	0
Calhoun	0	0	0	0	0	0	0	0	0	0
Callahan	0	0	0	0	0	0	0	0	0	0
Cameron	0	0	0	0	0	0	0	0	0	0
Camp	0	0	0	0	0	0	0	0	0	0
Carson	0	0	0	0	0	0	0	0	0	0
Castro	0	0	0	0	0	0	0	0	0	0
Chambers	0	0	0	0	0	0	0	0	0	0
Cherokee	0	0	0	0	0	0	0	0	0	0
Childress	0	0	0	0	0	0	0	0	0	0
Clay	0	0	0	0	0	0	0	0	0	0
Coke	0	0	0	0	0	0	0	0	0	0
Coleman	0	0	0	0	0	0	0	0	0	0
Collin	0	0	0	0	0	0	0	0	0	0
Collingsworth	0	0	0	0	0	0	0	0	0	0
Colorado	0	0	0	0	0	0	0	0	0	0
Comal	0	0	0	38	138	0	0	0	0	0
Comanche	0	0	0	0	0	0	0	0	0	0
Concho	0	0	0	0	0	0	0	0	0	0
Cooke	0	0	0	0	0	0	0	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

July 5, 2019

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Coryell	0	0	0	0	0	0	0	0	0	0
Cottle	0	0	0	0	0	0	0	0	0	0
Crane	0	0	0	0	0	0	0	0	0	0
Crockett	0	0	0	0	0	0	0	0	0	0
Crosby	0	0	0	0	0	0	0	0	0	0
Culberson	0	0	0	0	0	0	0	0	0	0
Dallas	0	0	0	0	0	0	0	0	0	0
Dawson	0	0	0	0	0	0	0	0	0	0
De Witt	0	0	0	0	0	0	0	0	0	0
Deaf Smith	0	0	0	0	0	0	0	0	0	0
Delta	0	0	0	0	0	0	0	0	0	0
Denton	0	0	0	0	0	0	0	0	0	0
Dickens	0	0	0	0	0	0	0	0	0	0
Dimmit	0	0	0	0	0	0	0	0	0	0
Donley	0	0	0	0	0	0	0	0	0	0
Duval	0	0	0	0	0	0	0	0	0	0
Eastland	0	0	0	0	0	0	0	0	0	0
Ector	0	0	0	0	0	0	0	0	0	0
Edwards	0	0	0	0	0	0	0	0	0	0
Ellis	0	0	0	0	0	0	0	0	0	0
Erath	0	0	0	0	0	0	0	0	0	0
Falls	0	0	0	0	0	0	0	0	0	0
Fannin	0	0	0	0	0	0	0	0	0	0
Fayette	0	0	0	0	0	0	0	0	0	0
Fisher	0	0	0	0	0	0	0	0	0	0
Floyd	0	0	0	0	0	0	0	0	0	0
Foard	0	0	0	0	0	0	0	0	0	0
Fort Bend	0	0	0	0	0	0	0	0	0	0
Franklin	0	0	0	0	0	0	0	0	0	0
Freestone	0	0	0	0	0	0	0	0	0	0
Frio	0	0	0	0	0	0	0	0	0	0
Gaines	0	0	0	0	0	0	0	0	0	0
Galveston	0	0	0	0	0	0	0	0	0	0
Garza	0	0	0	0	0	0	0	0	0	0
Gillespie	0	0	0	0	0	0	0	0	0	0
Glasscock	0	0	0	0	0	0	0	0	0	0
Goliad	0	0	0	0	0	0	0	0	0	0
Gonzales	0	0	0	0	0	0	0	0	0	0
Gray	0	0	0	0	0	0	0	0	0	0
Grayson	0	0	0	0	0	0	0	0	0	0
Gregg	0	0	0	0	0	0	0	0	0	0
Grimes	0	0	0	0	0	0	0	0	0	0
Guadalupe	0	0	0	0	0	0	0	0	0	0
Hale	0	0	0	0	0	0	0	0	0	0
Hall	0	0	0	0	0	0	0	0	0	0
Hamilton	0	0	0	0	0	0	0	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Hansford	0	0	0	0	0	0	0	0	0	0
Hardeman	0	0	0	0	0	0	0	0	0	0
Harris	0	0	0	0	0	0	0	0	0	0
Harrison	0	0	0	0	0	0	0	0	0	0
Hartley	0	0	0	0	0	0	0	0	0	0
Haskell	0	0	0	0	0	0	0	0	0	0
Hays	0	0	162	16	0	0	0	0	0	0
Hemphill	0	0	0	0	0	0	0	0	0	0
Henderson	0	0	0	0	0	0	0	0	0	0
Hidalgo	0	0	0	0	0	0	0	0	0	0
Hill	0	0	0	0	0	0	0	0	0	0
Hood	0	0	0	0	0	0	0	0	0	0
Hopkins	0	0	0	0	0	0	0	0	0	0
Houston	0	0	0	0	0	0	0	0	0	0
Howard	0	0	0	0	0	0	0	0	0	0
Hudspeth	0	0	0	0	0	0	0	0	0	0
Hunt	0	0	0	0	0	0	0	0	0	0
Hutchinson	0	0	0	0	0	0	0	0	0	0
Irion	0	0	0	0	0	0	0	0	0	0
Jack	0	0	0	0	0	0	0	0	0	0
Jackson	0	0	0	0	0	0	0	0	0	0
Jasper	0	0	0	0	0	0	0	0	0	0
Jeff Davis	0	0	0	0	0	0	0	0	0	0
Jefferson	0	0	0	0	0	0	0	0	0	0
Jim Hogg	0	0	0	0	0	0	0	0	0	0
Jim Wells	0	0	0	0	0	0	0	0	0	0
Johnson	0	0	0	0	0	0	0	0	0	0
Jones	0	0	0	0	0	0	0	0	0	0
Karnes	0	0	0	0	0	0	0	0	0	0
Kaufman	0	0	0	0	0	0	0	0	0	0
Kendall	0	0	0	0	0	0	0	0	0	0
Kenedy	0	0	0	0	0	0	0	0	0	0
Kent	0	0	0	0	0	0	0	0	0	0
Kerr	0	0	0	0	0	0	0	0	0	0
Kimble	0	0	0	0	0	0	0	0	0	0
King	0	0	0	0	0	0	0	0	0	0
Kinney	0	0	0	0	0	0	0	0	0	0
Kleberg	0	0	0	0	0	0	0	0	0	0
Knox	0	0	0	0	0	0	0	0	0	0
La Salle	0	0	0	0	0	0	0	0	0	0
Lamar	0	0	0	0	0	0	0	0	0	0
Lamb	0	0	0	0	0	0	0	0	0	0
Lampasas	0	0	0	0	0	0	0	0	0	0
Lavaca	0	0	0	0	0	0	0	0	0	0
Lee	0	0	0	0	0	0	0	0	0	0
Leon	0	0	0	0	0	0	0	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Liberty	0	0	0	0	0	0	0	0	0	0
Limestone	0	0	0	0	0	0	0	0	0	0
Lipscomb	0	0	0	0	0	0	0	0	0	0
Live Oak	0	0	0	0	0	0	0	0	0	0
Llano	0	0	0	0	0	0	0	0	0	0
Loving	0	0	0	0	0	0	0	0	0	0
Lubbock	0	0	0	0	0	0	0	0	0	0
Lynn	0	0	0	0	0	0	0	0	0	0
Madison	0	0	0	0	0	0	0	0	0	0
Martin	0	0	0	0	0	0	0	0	0	0
Mason	0	0	0	0	0	0	0	0	0	0
Matagorda	0	0	0	0	0	0	0	0	0	0
Maverick	0	0	0	0	0	0	0	0	0	0
Mcculloch	0	0	0	0	0	0	0	0	0	0
Mclennan	0	0	0	0	0	0	0	0	0	0
Mcmullen	0	0	0	0	0	0	0	0	0	0
Medina	0	0	0	0	0	0	0	0	20,162	20,162
Menard	0	0	0	0	0	0	0	0	0	0
Midland	0	0	0	0	0	0	0	0	0	0
Milam	0	0	0	0	0	0	0	0	0	0
Mills	0	0	0	0	0	0	0	0	0	0
Mitchell	0	0	0	0	0	0	0	0	0	0
Montague	0	0	0	0	0	0	0	0	0	0
Montgomery	0	0	0	0	0	0	0	0	0	0
Moore	0	0	0	0	0	0	0	0	0	0
Morris	0	0	0	0	0	0	0	0	0	0
Motley	0	0	0	0	0	0	0	0	0	0
Nacogdoches	0	0	0	0	0	0	0	0	0	0
Navarro	0	0	0	0	0	0	0	0	0	0
Nolan	0	0	0	0	0	0	0	0	0	0
Nueces	0	0	0	0	0	0	0	0	0	0
Ochiltree	0	0	0	0	0	0	0	0	0	0
Oldham	0	0	0	0	0	0	0	0	0	0
Palo Pinto	0	0	0	0	0	0	0	0	0	0
Panola	0	0	0	0	0	0	0	0	0	0
Parker	0	0	0	0	0	0	0	0	0	0
Parmer	0	0	0	0	0	0	0	0	0	0
Pecos	0	0	0	0	0	0	0	0	0	0
Polk	0	0	0	0	0	0	0	0	0	0
Potter	0	0	0	0	0	0	0	0	0	0
Presidio	0	0	0	0	0	0	0	0	0	0
Rains	0	0	0	0	0	0	0	0	0	0
Randall	0	0	0	0	0	0	0	0	0	0
Reagan	0	0	0	0	0	0	0	0	0	0
Real	0	0	0	0	0	0	0	0	0	0
Red River	0	0	0	0	0	0	0	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Reeves	0	0	0	0	0	0	0	0	0	0
Refugio	0	0	0	0	0	0	0	0	0	0
Roberts	0	0	0	0	0	0	0	0	0	0
Robertson	0	0	0	0	0	0	0	0	0	0
Rockwall	0	0	0	0	0	0	0	0	0	0
Runnels	0	0	0	0	0	0	0	0	0	0
Rusk	0	0	0	0	0	0	0	0	0	0
San Augustine	0	0	0	0	0	0	0	0	0	0
San Jacinto	0	0	0	0	0	0	0	0	0	0
San Patricio	0	0	0	0	0	0	0	0	0	0
San Saba	0	0	0	0	0	0	0	0	0	0
Schleicher	0	0	0	0	0	0	0	0	0	0
Scurry	0	0	0	0	0	0	0	0	0	0
Shackelford	0	0	0	0	0	0	0	0	0	0
Shelby	0	0	0	0	0	0	0	0	0	0
Smith	0	0	0	0	0	0	0	0	0	0
Somervell	0	0	0	0	0	0	0	0	0	0
Starr	0	0	0	0	0	0	0	0	0	0
Stephens	0	0	0	0	0	0	0	0	0	0
Sterling	0	0	0	0	0	0	0	0	0	0
Stonewall	0	0	0	0	0	0	0	0	0	0
Sutton	0	0	0	0	0	0	0	0	0	0
Swisher	0	0	0	0	0	0	0	0	0	0
Tarrant	0	0	0	0	0	0	0	0	0	0
Taylor	0	0	0	0	0	0	0	0	0	0
Terrell	0	0	0	0	0	0	0	0	0	0
Terry	0	0	0	0	0	0	0	0	0	0
Throckmorton	0	0	0	0	0	0	0	0	0	0
Titus	0	0	0	0	0	0	0	0	0	0
Tom Green	0	0	0	0	0	0	0	0	0	0
Travis	3,595	0	210	0	0	157,729	9,753	11,572	0	0
Trinity	0	0	0	0	0	0	0	0	0	0
Tyler	0	0	0	0	0	0	0	0	0	0
Upshur	0	0	0	0	0	0	0	0	0	0
Upton	0	0	0	0	0	0	0	0	0	0
Uvalde	0	0	0	0	0	0	0	0	0	0
Val Verde	0	0	0	0	0	0	0	0	0	0
Van Zandt	0	0	0	0	0	0	0	0	0	0
Victoria	0	0	0	0	0	0	0	0	0	0
Walker	0	0	0	0	0	0	0	0	0	0
Waller	0	0	0	0	0	0	0	0	0	0
Ward	0	0	0	0	0	0	0	0	0	0
Washington	0	0	0	0	0	0	0	0	0	0
Webb	0	0	0	0	0	0	0	0	0	0
Wharton	0	0	0	0	0	0	0	0	0	0
Wheeler	0	0	0	0	0	0	0	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Wichita	0	0	0	0	0	0	0	0	0	0
Wilbarger	0	0	0	0	0	0	0	0	0	0
Willacy	0	0	0	0	0	0	0	0	0	0
Williamson	736	0	0	0	0	0	5,578	10,666	0	0
Wilson	0	0	0	0	0	0	0	0	0	0
Winkler	0	0	0	0	0	0	0	0	0	0
Wise	0	0	0	0	0	0	0	0	0	0
Wood	0	0	0	0	0	0	0	0	0	0
Young	0	0	0	0	0	0	0	0	0	0
Zapata	0	0	0	0	0	0	0	0	0	0
Zavala	0	0	0	0	0	0	0	0	0	0
TOTAL Plan Area	**4,331**	**372**	**372**	**54**	**138**	**203,685**	**15,331**	**22,238**	**20,162**	**20,162**

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
	Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Anderson	0	0	0
Andrews	0	0	0
Angelina	0	0	0
Aransas	0	0	0
Archer	0	0	0
Armstrong	0	0	0
Atascosa	0	0	0
Austin	0	0	0
Bandera	0	0	0
Bastrop	0	0	0
Baylor	0	0	0
Bee	0	0	0
Bell	0	0	0
Bexar	0	0	0
Blanco	0	0	0
Borden	0	0	0
Bosque	0	0	0
Bowie	0	0	0
Brazoria	0	0	0
Brazos	0	0	0
Brewster	0	0	0
Briscoe	0	0	0
Brooks	0	0	0
Brown	0	0	0
Burleson	0	0	0
Burnet	0	0	0
Caldwell	0	0	0
Calhoun	0	0	0
Callahan	0	0	0
Cameron	0	0	0
Camp	0	0	0
Carson	0	0	0
Castro	0	0	0
Chambers	0	0	0
Cherokee	0	0	0
Childress	0	0	0
Clay	0	0	0
Coke	0	0	0
Coleman	0	0	0
Collin	0	0	0
Collingsworth	0	0	0
Colorado	0	0	0
Comal	0	0	0
Comanche	0	0	0
Concho	0	0	0
Cooke	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
	Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Coryell	0	0	0
Cottle	0	0	0
Crane	0	0	0
Crockett	0	0	0
Crosby	0	0	0
Culberson	0	0	0
Dallas	0	0	0
Dawson	0	0	0
De Witt	0	0	0
Deaf Smith	0	0	0
Delta	0	0	0
Denton	0	0	0
Dickens	0	0	0
Dimmit	0	0	0
Donley	0	0	0
Duval	0	0	0
Eastland	0	0	0
Ector	0	0	0
Edwards	0	0	0
Ellis	0	0	0
Erath	0	0	0
Falls	0	0	0
Fannin	0	0	0
Fayette	0	0	0
Fisher	0	0	0
Floyd	0	0	0
Foard	0	0	0
Fort Bend	0	0	0
Franklin	0	0	0
Freestone	0	0	0
Frio	0	0	0
Gaines	0	0	0
Galveston	0	0	0
Garza	0	0	0
Gillespie	0	0	0
Glasscock	0	0	0
Goliad	0	0	0
Gonzales	0	0	0
Gray	0	0	0
Grayson	0	0	0
Gregg	0	0	0
Grimes	0	0	0
Guadalupe	0	0	0
Hale	0	0	0
Hall	0	0	0
Hamilton	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
	Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Hansford	0	0	0
Hardeman	0	0	0
Harris	0	0	0
Harrison	0	0	0
Hartley	0	0	0
Haskell	0	0	0
Hays	0	0	0
Hemphill	0	0	0
Henderson	0	0	0
Hidalgo	0	0	0
Hill	0	0	0
Hood	0	0	0
Hopkins	0	0	0
Houston	0	0	0
Howard	0	0	0
Hudspeth	0	0	0
Hunt	0	0	0
Hutchinson	0	0	0
Irion	0	0	0
Jack	0	0	0
Jackson	0	0	0
Jasper	0	0	0
Jeff Davis	0	0	0
Jefferson	0	0	0
Jim Hogg	0	0	0
Jim Wells	0	0	0
Johnson	0	0	0
Jones	0	0	0
Karnes	0	0	0
Kaufman	0	0	0
Kendall	0	0	0
Kenedy	0	0	0
Kent	0	0	0
Kerr	0	0	0
Kimble	0	0	0
King	0	0	0
Kinney	0	0	0
Kleberg	0	0	0
Knox	0	0	0
La Salle	0	0	0
Lamar	0	0	0
Lamb	0	0	0
Lampasas	0	0	0
Lavaca	0	0	0
Lee	0	0	0
Leon	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
	Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Liberty	0	0	0
Limestone	0	0	0
Lipscomb	0	0	0
Live Oak	0	0	0
Llano	0	0	0
Loving	0	0	0
Lubbock	0	0	0
Lynn	0	0	0
Madison	0	0	0
Martin	0	0	0
Mason	0	0	0
Matagorda	0	0	0
Maverick	0	0	0
Mcculloch	0	0	0
Mclennan	0	0	0
Mcmullen	0	0	0
Medina	20,162	20,162	20,162
Menard	0	0	0
Midland	0	0	0
Milam	0	0	0
Mills	0	0	0
Mitchell	0	0	0
Montague	0	0	0
Montgomery	0	0	0
Moore	0	0	0
Morris	0	0	0
Motley	0	0	0
Nacogdoches	0	0	0
Navarro	0	0	0
Nolan	0	0	0
Nueces	0	0	0
Ochiltree	0	0	0
Oldham	0	0	0
Palo Pinto	0	0	0
Panola	0	0	0
Parker	0	0	0
Parmer	0	0	0
Pecos	0	0	0
Polk	0	0	0
Potter	0	0	0
Presidio	0	0	0
Rains	0	0	0
Randall	0	0	0
Reagan	0	0	0
Real	0	0	0
Red River	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
	Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Reeves	0	0	0
Refugio	0	0	0
Roberts	0	0	0
Robertson	0	0	0
Rockwall	0	0	0
Runnels	0	0	0
Rusk	0	0	0
San Augustine	0	0	0
San Jacinto	0	0	0
San Patricio	0	0	0
San Saba	0	0	0
Schleicher	0	0	0
Scurry	0	0	0
Shackelford	0	0	0
Shelby	0	0	0
Smith	0	0	0
Somervell	0	0	0
Starr	0	0	0
Stephens	0	0	0
Sterling	0	0	0
Stonewall	0	0	0
Sutton	0	0	0
Swisher	0	0	0
Tarrant	0	0	0
Taylor	0	0	0
Terrell	0	0	0
Terry	0	0	0
Throckmorton	0	0	0
Titus	0	0	0
Tom Green	0	0	0
Travis	0	0	0
Trinity	0	0	0
Tyler	0	0	0
Upshur	0	0	0
Upton	0	0	0
Uvalde	0	0	0
Val Verde	0	0	0
Van Zandt	0	0	0
Victoria	0	0	0
Walker	0	0	0
Waller	0	0	0
Ward	0	0	0
Washington	0	0	0
Webb	0	0	0
Wharton	0	0	0
Wheeler	0	0	0

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
	Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	*Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Wichita	0	0	0
Wilbarger	0	0	0
Willacy	0	0	0
Williamson	0	0	0
Wilson	0	0	0
Winkler	0	0	0
Wise	0	0	0
Wood	0	0	0
Young	0	0	0
Zapata	0	0	0
Zavala	0	0	0
TOTAL Plan Area	**20,162**	**20,162**	**20,162**

Data in acres, rounded to the nearest whole number

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Golden-cheeked Warbler *Texas A&M Institute of Renewable Natural Resources (TAMU IRNR) Habitat Model (Morrison et al. 2010).*	Whooping Crane *Winter habitat (land covers not including urban, woodland, forest, shrubland, or open water) within the Mid-coast Barrier Islands and Coastal Marshes Level IV Ecoregion between Aransas Pass and the Colorado River.*	Piping Plover *Texas Ecological Systems Database (TXESD) vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Rufa Red Knot *TXESD vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Red-cockaded Woodpecker *2011 NLCD Land Cover class for Evergreen Forest within range of the species.*	Ocelot *Estimated from Texas Ecological Systems Database (TXESD) vegetation classes that include a thornscrub component and that have at least 50% canopy cover, as estimated by the 2011 National Land Cover Dataset canopy cover layer.*	Spot-tailed Earless Lizard *Estimated from habitat model maps in Pierre et al. (2017) for high and low suitability of potential habitat within the current known range of the species.*	Houston Toad *Estimated from simple habitat model in Buzo (2008) for High and Medium Likelihood classes.*	Barton Springs Salamander *Estimated by applying a 984-foot zone around all known localities described by Devitt and Nissen (2018) as pertaining to the Barton Springs salamander.*	Georgetown Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*
Anderson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Andrews	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Angelina	0.000%	0.000%	0.000%	0.000%	25.418%	0.000%	0.000%	0.000%	0.000%	0.000%
Aransas	0.000%	52.242%	4.389%	4.389%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Archer	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Armstrong	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Atascosa	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Austin	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	12.030%	0.000%	0.000%
Bandera	45.186%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bastrop	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	37.001%	0.000%	0.000%
Baylor	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bee	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bell	13.756%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bexar	12.126%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Blanco	26.918%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Borden	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bosque	20.834%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bowie	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Brazoria	0.000%	0.000%	0.106%	0.106%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Brazos	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Brewster	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Briscoe	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Brooks	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Brown	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Burleson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	16.979%	0.000%	0.000%
Burnet	35.083%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Caldwell	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Calhoun	0.000%	42.006%	0.498%	0.498%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Callahan	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cameron	0.000%	0.000%	7.387%	7.387%	0.000%	4.009%	0.000%	0.000%	0.000%	0.000%
Camp	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Carson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Castro	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Chambers	0.000%	0.000%	0.008%	0.008%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cherokee	0.000%	0.000%	0.000%	0.000%	20.591%	0.000%	0.000%	0.000%	0.000%	0.000%
Childress	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Clay	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Coke	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	67.789%	0.000%	0.000%	0.000%
Coleman	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Collin	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Collingsworth	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Colorado	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	17.983%	0.000%	0.000%
Comal	41.911%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Comanche	0.010%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Concho	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	55.855%	0.000%	0.000%	0.000%
Cooke	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Golden-cheeked Warbler *Texas A&M Institute of Renewable Natural Resources (TAMU IRNR) Habitat Model (Morrison et al. 2010).*	Whooping Crane *Winter habitat (land covers not including urban, woodland, forest, shrubland, or open water) within the Mid-coast Barrier Islands and Coastal Marshes Level IV Ecoregion between Aransas Pass and the Colorado River.*	Piping Plover *Texas Ecological Systems Database (TXESD) vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Rufa Red Knot *TXESD vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Red-cockaded Woodpecker *2011 NLCD Land Cover class for Evergreen Forest within range of the species.*	Ocelot *Estimated from Texas Ecological Systems Database (TXESD) vegetation classes that include a thornscrub component and that have at least 50% canopy cover, as estimated by the 2011 National Land Cover Dataset canopy cover layer.*	Spot-tailed Earless Lizard *Estimated from habitat model maps in Pierre et al. (2017) for high and low suitability of potential habitat within the current known range of the species.*	Houston Toad *Estimated from simple habitat model in Buzo (2008) for High and Medium Likelihood classes.*	Barton Springs Salamander *Estimated by applying a 984-foot zone around all known localities described by Devitt and Nissen (2018) as pertaining to the Barton Springs salamander.*	Georgetown Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*
Coryell	20.807%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cottle	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Crane	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Crockett	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	45.114%	0.000%	0.000%	0.000%
Crosby	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Culberson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Dallas	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Dawson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
De Witt	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Deaf Smith	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Delta	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Denton	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Dickens	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Dimmit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Donley	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Duval	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Eastland	7.617%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Ector	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Edwards	18.323%	0.000%	0.000%	0.000%	0.000%	0.000%	43.564%	0.000%	0.000%	0.000%
Ellis	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Erath	16.954%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Falls	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Fannin	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Fayette	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Fisher	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Floyd	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Foard	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Fort Bend	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Franklin	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Freestone	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Frio	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Gaines	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Galveston	0.000%	0.000%	0.625%	0.625%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Garza	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Gillespie	22.970%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Glasscock	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	60.676%	0.000%	0.000%	0.000%
Goliad	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Gonzales	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Gray	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Grayson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Gregg	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Grimes	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Guadalupe	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hale	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hall	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hamilton	12.724%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Golden-cheeked Warbler *Texas A&M Institute of Renewable Natural Resources (TAMU IRNR) Habitat Model (Morrison et al. 2010).*	Whooping Crane *Winter habitat (land covers not including urban, woodland, forest, shrubland, or open water) within the Mid-coast Barrier Islands and Coastal Marshes Level IV Ecoregion between Aransas Pass and the Colorado River.*	Piping Plover *Texas Ecological Systems Database (TXESD) vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Rufa Red Knot *TXESD vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Red-cockaded Woodpecker *2011 NLCD Land Cover class for Evergreen Forest within range of the species.*	Ocelot *Estimated from Texas Ecological Systems Database (TXESD) vegetation classes that include a thornscrub component and that have at least 50% canopy cover, as estimated by the 2011 National Land Cover Dataset canopy cover layer.*	Spot-tailed Earless Lizard *Estimated from habitat model maps in Pierre et al. (2017) for high and low suitability of potential habitat within the current known range of the species.*	Houston Toad *Estimated from simple habitat model in Buzo (2008) for High and Medium Likelihood classes.*	Barton Springs Salamander *Estimated by applying a 984-foot zone around all known localities described by Devitt and Nissen (2018) as pertaining to the Barton Springs salamander.*	Georgetown Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*
Hansford	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hardeman	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Harris	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Harrison	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hartley	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Haskell	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hays	37.240%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.129%	0.000%
Hemphill	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Henderson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hidalgo	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hill	2.471%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hood	15.133%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hopkins	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Houston	0.000%	0.000%	0.000%	0.000%	24.218%	0.000%	0.000%	0.000%	0.000%	0.000%
Howard	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hudspeth	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hunt	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hutchinson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Irion	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	44.518%	0.000%	0.000%	0.000%
Jack	0.002%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jackson	0.000%	4.426%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jasper	0.000%	0.000%	0.000%	0.000%	28.860%	0.000%	0.000%	0.000%	0.000%	0.000%
Jeff Davis	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jefferson	0.000%	0.000%	0.105%	0.105%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jim Hogg	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jim Wells	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	22.461%	0.000%	0.000%	0.000%
Johnson	4.089%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jones	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Karnes	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kaufman	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kendall	31.658%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kenedy	0.000%	0.000%	12.272%	12.272%	0.000%	2.466%	0.000%	0.000%	0.000%	0.000%
Kent	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kerr	35.049%	0.000%	0.000%	0.000%	0.000%	0.000%	50.144%	0.000%	0.000%	0.000%
Kimble	22.910%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
King	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kinney	4.692%	0.000%	0.000%	0.000%	0.000%	0.000%	60.344%	0.000%	0.000%	0.000%
Kleberg	0.000%	0.000%	1.249%	1.249%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Knox	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
La Salle	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lamar	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lamb	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lampasas	20.406%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lavaca	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	29.938%	0.000%	0.000%
Lee	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	32.901%	0.000%	0.000%
Leon	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	15.952%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Golden-cheeked Warbler *Texas A&M Institute of Renewable Natural Resources (TAMU IRNR) Habitat Model (Morrison et al. 2010).*	Whooping Crane *Winter habitat (land covers not including urban, woodland, forest, shrubland, or open water) within the Mid-coast Barrier Islands and Coastal Marshes Level IV Ecoregion between Aransas Pass and the Colorado River.*	Piping Plover *Texas Ecological Systems Database (TXESD) vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Rufa Red Knot *TXESD vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Red-cockaded Woodpecker *2011 NLCD Land Cover class for Evergreen Forest within range of the species.*	Ocelot *Estimated from Texas Ecological Systems Database (TXESD) vegetation classes that include a thornscrub component and that have at least 50% canopy cover, as estimated by the 2011 National Land Cover Dataset canopy cover layer.*	Spot-tailed Earless Lizard *Estimated from habitat model maps in Pierre et al. (2017) for high and low suitability of potential habitat within the current known range of the species.*	Houston Toad *Estimated from simple habitat model in Buzo (2008) for High and Medium Likelihood classes.*	Barton Springs Salamander *Estimated by applying a 984-foot zone around all known localities described by Devitt and Nissen (2018) as pertaining to the Barton Springs salamander.*	Georgetown Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*
Liberty	0.000%	0.000%	0.000%	0.000%	7.794%	0.000%	0.000%	0.000%	0.000%	0.000%
Limestone	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lipscomb	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Live Oak	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Llano	16.771%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Loving	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lubbock	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lynn	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Madison	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Martin	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Mason	15.413%	0.000%	0.000%	0.000%	0.000%	0.000%	90.775%	0.000%	0.000%	0.000%
Matagorda	0.000%	8.085%	0.315%	0.315%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Maverick	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	82.493%	0.000%	0.000%	0.000%
Mcculloch	0.003%	0.000%	0.000%	0.000%	0.000%	0.000%	71.536%	0.000%	0.000%	0.000%
Mclennan	2.869%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Mcmullen	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Medina	14.354%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Menard	3.280%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Midland	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Milam	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	27.931%	0.000%	0.000%
Mills	0.004%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Mitchell	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Montague	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Montgomery	0.000%	0.000%	0.000%	0.000%	18.901%	0.000%	0.000%	0.000%	0.000%	0.000%
Moore	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Morris	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Motley	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Nacogdoches	0.000%	0.000%	0.000%	0.000%	22.617%	0.000%	0.000%	0.000%	0.000%	0.000%
Navarro	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Nolan	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Nueces	0.000%	0.576%	0.723%	0.723%	0.000%	0.000%	55.942%	0.000%	0.000%	0.000%
Ochiltree	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Oldham	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Palo Pinto	28.237%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Panola	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Parker	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Parmer	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Pecos	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Polk	0.000%	0.000%	0.000%	0.000%	31.703%	0.000%	0.000%	0.000%	0.000%	0.000%
Potter	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Presidio	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Rains	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Randall	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Reagan	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	54.955%	0.000%	0.000%	0.000%
Real	49.188%	0.000%	0.000%	0.000%	0.000%	0.000%	69.406%	0.000%	0.000%	0.000%
Red River	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Golden-cheeked Warbler *Texas A&M Institute of Renewable Natural Resources (TAMU IRNR) Habitat Model (Morrison et al. 2010).*	Whooping Crane *Winter habitat (land covers not including urban, woodland, forest, shrubland, or open water) within the Mid-coast Barrier Islands and Coastal Marshes Level IV Ecoregion between Aransas Pass and the Colorado River.*	Piping Plover *Texas Ecological Systems Database (TXESD) vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Rufa Red Knot *TXESD vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Red-cockaded Woodpecker *2011 NLCD Land Cover class for Evergreen Forest within range of the species.*	Ocelot *Estimated from Texas Ecological Systems Database (TXESD) vegetation classes that include a thornscrub component and that have at least 50% canopy cover, as estimated by the 2011 National Land Cover Dataset canopy cover layer.*	Spot-tailed Earless Lizard *Estimated from habitat model maps in Pierre et al. (2017) for high and low suitability of potential habitat within the current known range of the species.*	Houston Toad *Estimated from simple habitat model in Buzo (2008) for High and Medium Likelihood classes.*	Barton Springs Salamander *Estimated by applying a 984-foot zone around all known localities described by Devitt and Nissen (2018) as pertaining to the Barton Springs salamander.*	Georgetown Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*
Reeves	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Refugio	0.000%	5.552%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Roberts	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Robertson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	31.967%	0.000%	0.000%
Rockwall	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Runnels	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	57.359%	0.000%	0.000%	0.000%
Rusk	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
San Augustine	0.000%	0.000%	0.000%	0.000%	33.281%	0.000%	0.000%	0.000%	0.000%	0.000%
San Jacinto	0.000%	0.000%	0.000%	0.000%	28.867%	0.000%	0.000%	0.000%	0.000%	0.000%
San Patricio	0.000%	2.176%	0.020%	0.020%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
San Saba	17.464%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Schleicher	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	57.645%	0.000%	0.000%	0.000%
Scurry	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Shackelford	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Shelby	0.000%	0.000%	0.000%	0.000%	25.356%	0.000%	0.000%	0.000%	0.000%	0.000%
Smith	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Somervell	31.938%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Starr	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Stephens	9.822%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Sterling	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	38.155%	0.000%	0.000%	0.000%
Stonewall	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Sutton	0.002%	0.000%	0.000%	0.000%	0.000%	0.000%	43.718%	0.000%	0.000%	0.000%
Swisher	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Tarrant	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Taylor	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Terrell	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Terry	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Throckmorton	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Titus	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Tom Green	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	53.031%	0.000%	0.000%	0.000%
Travis	22.947%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.064%	0.000%
Trinity	0.000%	0.000%	0.000%	0.000%	41.056%	0.000%	0.000%	0.000%	0.000%	0.000%
Tyler	0.000%	0.000%	0.000%	0.000%	30.520%	0.000%	0.000%	0.000%	0.000%	0.000%
Upshur	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Upton	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Uvalde	15.673%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Val Verde	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	45.043%	0.000%	0.000%	0.000%
Van Zandt	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Victoria	0.000%	1.682%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Walker	0.000%	0.000%	0.000%	0.000%	32.918%	0.000%	0.000%	0.000%	0.000%	0.000%
Waller	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Ward	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Washington	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Webb	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Wharton	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Wheeler	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Golden-cheeked Warbler *Texas A&M Institute of Renewable Natural Resources (TAMU IRNR) Habitat Model (Morrison et al. 2010).*	Whooping Crane *Winter habitat (land covers not including urban, woodland, forest, shrubland, or open water) within the Mid-coast Barrier Islands and Coastal Marshes Level IV Ecoregion between Aransas Pass and the Colorado River.*	Piping Plover *Texas Ecological Systems Database (TXESD) vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Rufa Red Knot *TXESD vegetation classes for Beach, Wind Tidal Flat, Saline Lake Flats, and Algal Flats. Based on aerial imagery review, added long strips of beach on the upper Gulf Coast that had classes of Urban High Density or other tidal marsh or tidal flat.*	Red-cockaded Woodpecker *2011 NLCD Land Cover class for Evergreen Forest within range of the species.*	Ocelot *Estimated from Texas Ecological Systems Database (TXESD) vegetation classes that include a thornscrub component and that have at least 50% canopy cover, as estimated by the 2011 National Land Cover Dataset canopy cover layer.*	Spot-tailed Earless Lizard *Estimated from habitat model maps in Pierre et al. (2017) for high and low suitability of potential habitat within the current known range of the species.*	Houston Toad *Estimated from simple habitat model in Buzo (2008) for High and Medium Likelihood classes.*	Barton Springs Salamander *Estimated by applying a 984-foot zone around all known localities described by Devitt and Nissen (2018) as pertaining to the Barton Springs salamander.*	Georgetown Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*
Wichita	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Wilbarger	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Willacy	0.000%	0.000%	9.261%	9.261%	0.000%	6.150%	0.000%	0.000%	0.000%	0.000%
Williamson	11.428%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.142%
Wilson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Winkler	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Wise	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Wood	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Young	0.002%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Zapata	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Zavala	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
TOTAL Plan Area	**2.548%**	**0.230%**	**0.150%**	**0.150%**	**1.309%**	**0.048%**	**5.847%**	**0.760%**	**0.001%**	**0.001%**

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Anderson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Andrews	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Angelina	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Aransas	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Archer	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Armstrong	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Atascosa	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Austin	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bandera	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bastrop	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Baylor	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bee	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bell	0.000%	0.053%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bexar	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Blanco	0.000%	0.000%	0.000%	0.000%	0.000%	0.736%	0.000%	0.000%	0.000%	0.000%
Borden	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bosque	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Bowie	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Brazoria	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Brazos	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Brewster	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Briscoe	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Brooks	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Brown	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Burleson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Burnet	0.000%	0.000%	0.000%	0.000%	0.000%	6.532%	0.000%	0.000%	0.000%	0.000%
Caldwell	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Calhoun	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Callahan	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cameron	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Camp	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Carson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Castro	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Chambers	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cherokee	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Childress	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Clay	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Coke	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Coleman	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Collin	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Collingsworth	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Colorado	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Comal	0.000%	0.000%	0.000%	0.010%	0.037%	0.000%	0.000%	0.000%	0.000%	0.000%
Comanche	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Concho	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cooke	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Coryell	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cottle	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Crane	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Crockett	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Crosby	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Culberson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Dallas	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Dawson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
De Witt	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Deaf Smith	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Delta	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Denton	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Dickens	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Dimmit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Donley	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Duval	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Eastland	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Ector	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Edwards	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Ellis	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Erath	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Falls	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Fannin	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Fayette	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Fisher	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Floyd	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Foard	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Fort Bend	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Franklin	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Freestone	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Frio	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Gaines	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Galveston	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Garza	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Gillespie	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Glasscock	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Goliad	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Gonzales	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Gray	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Grayson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Gregg	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Grimes	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Guadalupe	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hale	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hall	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hamilton	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Hansford	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hardeman	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Harris	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Harrison	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hartley	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Haskell	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hays	0.000%	0.000%	0.037%	0.004%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hemphill	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Henderson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hidalgo	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hill	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hood	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hopkins	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Houston	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Howard	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hudspeth	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hunt	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Hutchinson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Irion	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jack	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jackson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jasper	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jeff Davis	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jefferson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jim Hogg	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jim Wells	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Johnson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Jones	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Karnes	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kaufman	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kendall	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kenedy	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kent	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kerr	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kimble	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
King	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kinney	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Kleberg	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Knox	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
La Salle	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lamar	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lamb	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lampasas	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lavaca	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lee	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Leon	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Liberty	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Limestone	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lipscomb	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Live Oak	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Llano	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Loving	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lubbock	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Lynn	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Madison	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Martin	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Mason	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Matagorda	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Maverick	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Mcculloch	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Mclennan	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Mcmullen	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Medina	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	2.353%	2.353%
Menard	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Midland	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Milam	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Mills	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Mitchell	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Montague	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Montgomery	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Moore	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Morris	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Motley	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Nacogdoches	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Navarro	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Nolan	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Nueces	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Ochiltree	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Oldham	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Palo Pinto	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Panola	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Parker	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Parmer	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Pecos	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Polk	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Potter	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Presidio	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Rains	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Randall	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Reagan	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Real	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Red River	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Reeves	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Refugio	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Roberts	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Robertson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Rockwall	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Runnels	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Rusk	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
San Augustine	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
San Jacinto	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
San Patricio	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
San Saba	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Schleicher	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Scurry	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Shackelford	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Shelby	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Smith	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Somervell	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Starr	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Stephens	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Sterling	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Stonewall	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Sutton	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Swisher	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Tarrant	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Taylor	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Terrell	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Terry	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Throckmorton	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Titus	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Tom Green	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Travis	0.548%	0.000%	0.032%	0.000%	0.000%	24.031%	1.486%	1.763%	0.000%	0.000%
Trinity	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Tyler	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Upshur	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Upton	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Uvalde	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Val Verde	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Van Zandt	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Victoria	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Walker	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Waller	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Ward	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Washington	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Webb	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Wharton	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Wheeler	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Jollyville Plateau Salamander *Estimated from extent of critical habitat (78 Federal Register 51327-51379).*	Salado Springs Salamander *Estimated from extent of proposed critical habitat (78 Federal Register 5385-5403).*	San Marcos Salamander *Estimated by the critical habitat at San Marcos Springs (45 Federal Register 47355-47364) and by applying a 984-foot zone around all other known localities described by Bendik et al. (2013) as containing genetic material from the San Marcos salamander, including at Barton Springs.*	Comal Springs Riffle Beetle *Estimated from extent of critical habitat (78 Federal Register 63100-63127).*	Peck's Cave amphipod *Estimated from extent of subsuface critical habitat (78 Federal Register 63100-63127).*	Bee Creek Cave Harvestman *Estimated by the extent of the species' range, as delineated by James Reddell in unpublished maps. This species is not a troglobite and not restricted to karst environments.*	Tooth Cave Spider *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Tooth Cave Ground Beetle *Estimated from extent of Karst Zone 1 or 2 (Veni and Martinez 2007) within the range of the species, as delineated by James Reddell in unpublished maps.*	Madla Cave Meshweaver *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Government Canyon Bat Cave Spider *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Wichita	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Wilbarger	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Willacy	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Williamson	0.101%	0.000%	0.000%	0.000%	0.000%	0.000%	0.767%	1.467%	0.000%	0.000%
Wilson	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Winkler	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Wise	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Wood	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Young	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Zapata	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Zavala	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
TOTAL Plan Area	**0.003%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.125%**	**0.009%**	**0.014%**	**0.012%**	**0.012%**

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Helotes Mold Beetle *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Elongate Ground Beetle with no common name (***Rhadine exilis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Robust Ground Beetle with no common name (***Rhadine infernalis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Anderson	0.000%	0.000%	0.000%
Andrews	0.000%	0.000%	0.000%
Angelina	0.000%	0.000%	0.000%
Aransas	0.000%	0.000%	0.000%
Archer	0.000%	0.000%	0.000%
Armstrong	0.000%	0.000%	0.000%
Atascosa	0.000%	0.000%	0.000%
Austin	0.000%	0.000%	0.000%
Bandera	0.000%	0.000%	0.000%
Bastrop	0.000%	0.000%	0.000%
Baylor	0.000%	0.000%	0.000%
Bee	0.000%	0.000%	0.000%
Bell	0.000%	0.000%	0.000%
Bexar	0.000%	0.000%	0.000%
Blanco	0.000%	0.000%	0.000%
Borden	0.000%	0.000%	0.000%
Bosque	0.000%	0.000%	0.000%
Bowie	0.000%	0.000%	0.000%
Brazoria	0.000%	0.000%	0.000%
Brazos	0.000%	0.000%	0.000%
Brewster	0.000%	0.000%	0.000%
Briscoe	0.000%	0.000%	0.000%
Brooks	0.000%	0.000%	0.000%
Brown	0.000%	0.000%	0.000%
Burleson	0.000%	0.000%	0.000%
Burnet	0.000%	0.000%	0.000%
Caldwell	0.000%	0.000%	0.000%
Calhoun	0.000%	0.000%	0.000%
Callahan	0.000%	0.000%	0.000%
Cameron	0.000%	0.000%	0.000%
Camp	0.000%	0.000%	0.000%
Carson	0.000%	0.000%	0.000%
Castro	0.000%	0.000%	0.000%
Chambers	0.000%	0.000%	0.000%
Cherokee	0.000%	0.000%	0.000%
Childress	0.000%	0.000%	0.000%
Clay	0.000%	0.000%	0.000%
Coke	0.000%	0.000%	0.000%
Coleman	0.000%	0.000%	0.000%
Collin	0.000%	0.000%	0.000%
Collingsworth	0.000%	0.000%	0.000%
Colorado	0.000%	0.000%	0.000%
Comal	0.000%	0.000%	0.000%
Comanche	0.000%	0.000%	0.000%
Concho	0.000%	0.000%	0.000%
Cooke	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Helotes Mold Beetle *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Elongate Ground Beetle with no common name (***Rhadine exilis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Robust Ground Beetle with no common name (***Rhadine infernalis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Coryell	0.000%	0.000%	0.000%
Cottle	0.000%	0.000%	0.000%
Crane	0.000%	0.000%	0.000%
Crockett	0.000%	0.000%	0.000%
Crosby	0.000%	0.000%	0.000%
Culberson	0.000%	0.000%	0.000%
Dallas	0.000%	0.000%	0.000%
Dawson	0.000%	0.000%	0.000%
De Witt	0.000%	0.000%	0.000%
Deaf Smith	0.000%	0.000%	0.000%
Delta	0.000%	0.000%	0.000%
Denton	0.000%	0.000%	0.000%
Dickens	0.000%	0.000%	0.000%
Dimmit	0.000%	0.000%	0.000%
Donley	0.000%	0.000%	0.000%
Duval	0.000%	0.000%	0.000%
Eastland	0.000%	0.000%	0.000%
Ector	0.000%	0.000%	0.000%
Edwards	0.000%	0.000%	0.000%
Ellis	0.000%	0.000%	0.000%
Erath	0.000%	0.000%	0.000%
Falls	0.000%	0.000%	0.000%
Fannin	0.000%	0.000%	0.000%
Fayette	0.000%	0.000%	0.000%
Fisher	0.000%	0.000%	0.000%
Floyd	0.000%	0.000%	0.000%
Foard	0.000%	0.000%	0.000%
Fort Bend	0.000%	0.000%	0.000%
Franklin	0.000%	0.000%	0.000%
Freestone	0.000%	0.000%	0.000%
Frio	0.000%	0.000%	0.000%
Gaines	0.000%	0.000%	0.000%
Galveston	0.000%	0.000%	0.000%
Garza	0.000%	0.000%	0.000%
Gillespie	0.000%	0.000%	0.000%
Glasscock	0.000%	0.000%	0.000%
Goliad	0.000%	0.000%	0.000%
Gonzales	0.000%	0.000%	0.000%
Gray	0.000%	0.000%	0.000%
Grayson	0.000%	0.000%	0.000%
Gregg	0.000%	0.000%	0.000%
Grimes	0.000%	0.000%	0.000%
Guadalupe	0.000%	0.000%	0.000%
Hale	0.000%	0.000%	0.000%
Hall	0.000%	0.000%	0.000%
Hamilton	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Helotes Mold Beetle *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Elongate Ground Beetle with no common name (***Rhadine exilis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Robust Ground Beetle with no common name (***Rhadine infernalis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Hansford	0.000%	0.000%	0.000%
Hardeman	0.000%	0.000%	0.000%
Harris	0.000%	0.000%	0.000%
Harrison	0.000%	0.000%	0.000%
Hartley	0.000%	0.000%	0.000%
Haskell	0.000%	0.000%	0.000%
Hays	0.000%	0.000%	0.000%
Hemphill	0.000%	0.000%	0.000%
Henderson	0.000%	0.000%	0.000%
Hidalgo	0.000%	0.000%	0.000%
Hill	0.000%	0.000%	0.000%
Hood	0.000%	0.000%	0.000%
Hopkins	0.000%	0.000%	0.000%
Houston	0.000%	0.000%	0.000%
Howard	0.000%	0.000%	0.000%
Hudspeth	0.000%	0.000%	0.000%
Hunt	0.000%	0.000%	0.000%
Hutchinson	0.000%	0.000%	0.000%
Irion	0.000%	0.000%	0.000%
Jack	0.000%	0.000%	0.000%
Jackson	0.000%	0.000%	0.000%
Jasper	0.000%	0.000%	0.000%
Jeff Davis	0.000%	0.000%	0.000%
Jefferson	0.000%	0.000%	0.000%
Jim Hogg	0.000%	0.000%	0.000%
Jim Wells	0.000%	0.000%	0.000%
Johnson	0.000%	0.000%	0.000%
Jones	0.000%	0.000%	0.000%
Karnes	0.000%	0.000%	0.000%
Kaufman	0.000%	0.000%	0.000%
Kendall	0.000%	0.000%	0.000%
Kenedy	0.000%	0.000%	0.000%
Kent	0.000%	0.000%	0.000%
Kerr	0.000%	0.000%	0.000%
Kimble	0.000%	0.000%	0.000%
King	0.000%	0.000%	0.000%
Kinney	0.000%	0.000%	0.000%
Kleberg	0.000%	0.000%	0.000%
Knox	0.000%	0.000%	0.000%
La Salle	0.000%	0.000%	0.000%
Lamar	0.000%	0.000%	0.000%
Lamb	0.000%	0.000%	0.000%
Lampasas	0.000%	0.000%	0.000%
Lavaca	0.000%	0.000%	0.000%
Lee	0.000%	0.000%	0.000%
Leon	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Helotes Mold Beetle *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Elongate Ground Beetle with no common name (***Rhadine exilis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Robust Ground Beetle with no common name (***Rhadine infernalis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Liberty	0.000%	0.000%	0.000%
Limestone	0.000%	0.000%	0.000%
Lipscomb	0.000%	0.000%	0.000%
Live Oak	0.000%	0.000%	0.000%
Llano	0.000%	0.000%	0.000%
Loving	0.000%	0.000%	0.000%
Lubbock	0.000%	0.000%	0.000%
Lynn	0.000%	0.000%	0.000%
Madison	0.000%	0.000%	0.000%
Martin	0.000%	0.000%	0.000%
Mason	0.000%	0.000%	0.000%
Matagorda	0.000%	0.000%	0.000%
Maverick	0.000%	0.000%	0.000%
Mcculloch	0.000%	0.000%	0.000%
Mclennan	0.000%	0.000%	0.000%
Mcmullen	0.000%	0.000%	0.000%
Medina	2.353%	2.353%	2.353%
Menard	0.000%	0.000%	0.000%
Midland	0.000%	0.000%	0.000%
Milam	0.000%	0.000%	0.000%
Mills	0.000%	0.000%	0.000%
Mitchell	0.000%	0.000%	0.000%
Montague	0.000%	0.000%	0.000%
Montgomery	0.000%	0.000%	0.000%
Moore	0.000%	0.000%	0.000%
Morris	0.000%	0.000%	0.000%
Motley	0.000%	0.000%	0.000%
Nacogdoches	0.000%	0.000%	0.000%
Navarro	0.000%	0.000%	0.000%
Nolan	0.000%	0.000%	0.000%
Nueces	0.000%	0.000%	0.000%
Ochiltree	0.000%	0.000%	0.000%
Oldham	0.000%	0.000%	0.000%
Palo Pinto	0.000%	0.000%	0.000%
Panola	0.000%	0.000%	0.000%
Parker	0.000%	0.000%	0.000%
Parmer	0.000%	0.000%	0.000%
Pecos	0.000%	0.000%	0.000%
Polk	0.000%	0.000%	0.000%
Potter	0.000%	0.000%	0.000%
Presidio	0.000%	0.000%	0.000%
Rains	0.000%	0.000%	0.000%
Randall	0.000%	0.000%	0.000%
Reagan	0.000%	0.000%	0.000%
Real	0.000%	0.000%	0.000%
Red River	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Helotes Mold Beetle *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Elongate Ground Beetle with no common name (***Rhadine exilis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Robust Ground Beetle with no common name (***Rhadine infernalis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Reeves	0.000%	0.000%	0.000%
Refugio	0.000%	0.000%	0.000%
Roberts	0.000%	0.000%	0.000%
Robertson	0.000%	0.000%	0.000%
Rockwall	0.000%	0.000%	0.000%
Runnels	0.000%	0.000%	0.000%
Rusk	0.000%	0.000%	0.000%
San Augustine	0.000%	0.000%	0.000%
San Jacinto	0.000%	0.000%	0.000%
San Patricio	0.000%	0.000%	0.000%
San Saba	0.000%	0.000%	0.000%
Schleicher	0.000%	0.000%	0.000%
Scurry	0.000%	0.000%	0.000%
Shackelford	0.000%	0.000%	0.000%
Shelby	0.000%	0.000%	0.000%
Smith	0.000%	0.000%	0.000%
Somervell	0.000%	0.000%	0.000%
Starr	0.000%	0.000%	0.000%
Stephens	0.000%	0.000%	0.000%
Sterling	0.000%	0.000%	0.000%
Stonewall	0.000%	0.000%	0.000%
Sutton	0.000%	0.000%	0.000%
Swisher	0.000%	0.000%	0.000%
Tarrant	0.000%	0.000%	0.000%
Taylor	0.000%	0.000%	0.000%
Terrell	0.000%	0.000%	0.000%
Terry	0.000%	0.000%	0.000%
Throckmorton	0.000%	0.000%	0.000%
Titus	0.000%	0.000%	0.000%
Tom Green	0.000%	0.000%	0.000%
Travis	0.000%	0.000%	0.000%
Trinity	0.000%	0.000%	0.000%
Tyler	0.000%	0.000%	0.000%
Upshur	0.000%	0.000%	0.000%
Upton	0.000%	0.000%	0.000%
Uvalde	0.000%	0.000%	0.000%
Val Verde	0.000%	0.000%	0.000%
Van Zandt	0.000%	0.000%	0.000%
Victoria	0.000%	0.000%	0.000%
Walker	0.000%	0.000%	0.000%
Waller	0.000%	0.000%	0.000%
Ward	0.000%	0.000%	0.000%
Washington	0.000%	0.000%	0.000%
Webb	0.000%	0.000%	0.000%
Wharton	0.000%	0.000%	0.000%
Wheeler	0.000%	0.000%	0.000%

Appendix E -- County-Level Habitat for Covered Species, as Percent of County Area

Plan Area County Name	Helotes Mold Beetle *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Elongate Ground Beetle with no common name (***Rhadine exilis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*	Robust Ground Beetle with no common name (***Rhadine infernalis***) *Estimated from the acres of Karst Zone 1 or 2 (Veni 2003) within Medina County.*
Wichita	0.000%	0.000%	0.000%
Wilbarger	0.000%	0.000%	0.000%
Willacy	0.000%	0.000%	0.000%
Williamson	0.000%	0.000%	0.000%
Wilson	0.000%	0.000%	0.000%
Winkler	0.000%	0.000%	0.000%
Wise	0.000%	0.000%	0.000%
Wood	0.000%	0.000%	0.000%
Young	0.000%	0.000%	0.000%
Zapata	0.000%	0.000%	0.000%
Zavala	0.000%	0.000%	0.000%
TOTAL Plan Area	**0.012%**	**0.012%**	**0.012%**

APPENDIX F

Estimated Direct Habitat Modification and Indirect Habitat Modification for Covered Species

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Appendix F -- Estimated Direct Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Golden-cheeked Warbler	Whooping Crane	Piping Plover	Rufa Red Knot	Red-cockaded Woodpecker	Ocelot	Spot-tailed Earless Lizard	Houston Toad	Barton Springs Salamander	Georgetown Salamander
Take Exposure	S/PUM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	S/PUM	S/PUM	SS/PUM + SS/PM	S/PUM	SS/PUM + SS/PM	SS/PUM + SS/PM
Take Likelihood	1	0.1	0.1	0.1	0.5	1	0.1	0.8	1	1
Anderson	0	0	0	0	0	0	0	0	0	0
Andrews	0	0	0	0	0	0	0	0	0	0
Angelina	0	0	0	0	12	0	0	0	0	0
Aransas	0	11	1	1	0	0	0	0	0	0
Archer	0	0	0	0	0	0	0	0	0	0
Armstrong	0	0	0	0	0	0	0	0	0	0
Atascosa	0	0	0	0	0	0	0	0	0	0
Austin	0	0	0	0	0	0	0	21	0	0
Bandera	98	0	0	0	0	0	0	0	0	0
Bastrop	0	0	0	0	0	0	0	64	0	0
Baylor	0	0	0	0	0	0	0	0	0	0
Bee	0	0	0	0	0	0	0	0	0	0
Bell	26	0	0	0	0	0	0	0	0	0
Bexar	26	0	0	0	0	0	0	0	0	0
Blanco	58	0	0	0	0	0	0	0	0	0
Borden	0	0	0	0	0	0	0	0	0	0
Bosque	39	0	0	0	0	0	0	0	0	0
Bowie	0	0	0	0	0	0	0	0	0	0
Brazoria	0	0	0	0	0	0	0	0	0	0
Brazos	0	0	0	0	0	0	0	0	0	0
Brewster	0	0	0	0	0	0	0	0	0	0
Briscoe	0	0	0	0	0	0	0	0	0	0
Brooks	0	0	0	0	0	0	0	0	0	0
Brown	0	0	0	0	0	0	0	0	0	0
Burleson	0	0	0	0	0	0	0	29	0	0
Burnet	76	0	0	0	0	0	0	0	0	0
Caldwell	0	0	0	0	0	0	0	0	0	0
Calhoun	0	8	0	0	0	0	0	0	0	0
Callahan	0	0	0	0	0	0	0	0	0	0
Cameron	0	0	2	2	0	9	0	0	0	0
Camp	0	0	0	0	0	0	0	0	0	0
Carson	0	0	0	0	0	0	0	0	0	0
Castro	0	0	0	0	0	0	0	0	0	0
Chambers	0	0	0	0	0	0	0	0	0	0
Cherokee	0	0	0	0	10	0	0	0	0	0
Childress	0	0	0	0	0	0	0	0	0	0
Clay	0	0	0	0	0	0	0	0	0	0
Coke	0	0	0	0	0	0	15	0	0	0
Coleman	0	0	0	0	0	0	0	0	0	0
Collin	0	0	0	0	0	0	0	0	0	0
Collingsworth	0	0	0	0	0	0	0	0	0	0
Colorado	0	0	0	0	0	0	0	31	0	0
Comal	90	0	0	0	0	0	0	0	0	0
Comanche	0	0	0	0	0	0	0	0	0	0
Concho	0	0	0	0	0	0	12	0	0	0
Cooke	0	0	0	0	0	0	0	0	0	0
Coryell	45	0	0	0	0	0	0	0	0	0
Cottle	0	0	0	0	0	0	0	0	0	0
Crane	0	0	0	0	0	0	0	0	0	0
Crockett	0	0	0	0	0	0	10	0	0	0
Crosby	0	0	0	0	0	0	0	0	0	0
Culberson	0	0	0	0	0	0	0	0	0	0
Dallas	0	0	0	0	0	0	0	0	0	0
Dawson	0	0	0	0	0	0	0	0	0	0
De Witt	0	0	0	0	0	0	0	0	0	0
Deaf Smith	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Golden-cheeked Warbler	Whooping Crane	Piping Plover	Rufa Red Knot	Red-cockaded Woodpecker	Ocelot	Spot-tailed Earless Lizard	Houston Toad	Barton Springs Salamander	Georgetown Salamander
Take Exposure	S/PUM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	S/PUM	S/PUM	SS/PUM + SS/PM	S/PUM	SS/PUM + SS/PM	SS/PUM + SS/PM
Take Likelihood	1	0.1	0.1	0.1	0.5	1	0.1	0.8	1	1
Delta	0	0	0	0	0	0	0	0	0	0
Denton	0	0	0	0	0	0	0	0	0	0
Dickens	0	0	0	0	0	0	0	0	0	0
Dimmit	0	0	0	0	0	0	0	0	0	0
Donley	0	0	0	0	0	0	0	0	0	0
Duval	0	0	0	0	0	0	0	0	0	0
Eastland	14	0	0	0	0	0	0	0	0	0
Ector	0	0	0	0	0	0	0	0	0	0
Edwards	40	0	0	0	0	0	10	0	0	0
Ellis	0	0	0	0	0	0	0	0	0	0
Erath	32	0	0	0	0	0	0	0	0	0
Falls	0	0	0	0	0	0	0	0	0	0
Fannin	0	0	0	0	0	0	0	0	0	0
Fayette	0	0	0	0	0	0	0	0	0	0
Fisher	0	0	0	0	0	0	0	0	0	0
Floyd	0	0	0	0	0	0	0	0	0	0
Foard	0	0	0	0	0	0	0	0	0	0
Fort Bend	0	0	0	0	0	0	0	0	0	0
Franklin	0	0	0	0	0	0	0	0	0	0
Freestone	0	0	0	0	0	0	0	0	0	0
Frio	0	0	0	0	0	0	0	0	0	0
Gaines	0	0	0	0	0	0	0	0	0	0
Galveston	0	0	0	0	0	0	0	0	0	0
Garza	0	0	0	0	0	0	0	0	0	0
Gillespie	50	0	0	0	0	0	0	0	0	0
Glasscock	0	0	0	0	0	0	12	0	0	0
Goliad	0	0	0	0	0	0	0	0	0	0
Gonzales	0	0	0	0	0	0	0	0	0	0
Gray	0	0	0	0	0	0	0	0	0	0
Grayson	0	0	0	0	0	0	0	0	0	0
Gregg	0	0	0	0	0	0	0	0	0	0
Grimes	0	0	0	0	0	0	0	0	0	0
Guadalupe	0	0	0	0	0	0	0	0	0	0
Hale	0	0	0	0	0	0	0	0	0	0
Hall	0	0	0	0	0	0	0	0	0	0
Hamilton	27	0	0	0	0	0	0	0	0	0
Hansford	0	0	0	0	0	0	0	0	0	0
Hardeman	0	0	0	0	0	0	0	0	0	0
Harris	0	0	0	0	0	0	0	0	0	0
Harrison	0	0	0	0	0	0	0	0	0	0
Hartley	0	0	0	0	0	0	0	0	0	0
Haskell	0	0	0	0	0	0	0	0	0	0
Hays	80	0	0	0	0	0	0	0	0	0
Hemphill	0	0	0	0	0	0	0	0	0	0
Henderson	0	0	0	0	0	0	0	0	0	0
Hidalgo	0	0	0	0	0	0	0	0	0	0
Hill	2	0	0	0	0	0	0	0	0	0
Hood	14	0	0	0	0	0	0	0	0	0
Hopkins	0	0	0	0	0	0	0	0	0	0
Houston	0	0	0	0	11	0	0	0	0	0
Howard	0	0	0	0	0	0	0	0	0	0
Hudspeth	0	0	0	0	0	0	0	0	0	0
Hunt	0	0	0	0	0	0	0	0	0	0
Hutchinson	0	0	0	0	0	0	0	0	0	0
Irion	0	0	0	0	0	0	9	0	0	0
Jack	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Golden-cheeked Warbler	Whooping Crane	Piping Plover	Rufa Red Knot	Red-cockaded Woodpecker	Ocelot	Spot-tailed Earless Lizard	Houston Toad	Barton Springs Salamander	Georgetown Salamander
Take Exposure	S/PUM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	S/PUM	S/PUM	SS/PUM + SS/PM	S/PUM	SS/PUM + SS/PM	SS/PUM + SS/PM
Take Likelihood	1	0.1	0.1	0.1	0.5	1	0.1	0.8	1	1
Jackson	0	1	0	0	0	0	0	0	0	0
Jasper	0	0	0	0	1	0	0	0	0	0
Jeff Davis	0	0	0	0	0	0	0	0	0	0
Jefferson	0	0	0	0	0	0	0	0	0	0
Jim Hogg	0	0	0	0	0	0	0	0	0	0
Jim Wells	0	0	0	0	0	0	4	0	0	0
Johnson	4	0	0	0	0	0	0	0	0	0
Jones	0	0	0	0	0	0	0	0	0	0
Karnes	0	0	0	0	0	0	0	0	0	0
Kaufman	0	0	0	0	0	0	0	0	0	0
Kendall	68	0	0	0	0	0	0	0	0	0
Kenedy	0	0	2	2	0	5	0	0	0	0
Kent	0	0	0	0	0	0	0	0	0	0
Kerr	76	0	0	0	0	0	11	0	0	0
Kimble	49	0	0	0	0	0	0	0	0	0
King	0	0	0	0	0	0	0	0	0	0
Kinney	10	0	0	0	0	0	13	0	0	0
Kleberg	0	0	0	0	0	0	0	0	0	0
Knox	0	0	0	0	0	0	0	0	0	0
La Salle	0	0	0	0	0	0	0	0	0	0
Lamar	0	0	0	0	0	0	0	0	0	0
Lamb	0	0	0	0	0	0	0	0	0	0
Lampasas	44	0	0	0	0	0	0	0	0	0
Lavaca	0	0	0	0	0	0	0	52	0	0
Lee	0	0	0	0	0	0	0	57	0	0
Leon	0	0	0	0	0	0	0	12	0	0
Liberty	0	0	0	0	0	0	0	0	0	0
Limestone	0	0	0	0	0	0	0	0	0	0
Lipscomb	0	0	0	0	0	0	0	0	0	0
Live Oak	0	0	0	0	0	0	0	0	0	0
Llano	36	0	0	0	0	0	0	0	0	0
Loving	0	0	0	0	0	0	0	0	0	0
Lubbock	0	0	0	0	0	0	0	0	0	0
Lynn	0	0	0	0	0	0	0	0	0	0
Madison	0	0	0	0	0	0	0	0	0	0
Martin	0	0	0	0	0	0	0	0	0	0
Mason	33	0	0	0	0	0	20	0	0	0
Matagorda	0	2	0	0	0	0	0	0	0	0
Maverick	0	0	0	0	0	0	18	0	0	0
Mcculloch	0	0	0	0	0	0	16	0	0	0
Mclennan	5	0	0	0	0	0	0	0	0	0
Mcmullen	0	0	0	0	0	0	0	0	0	0
Medina	31	0	0	0	0	0	0	0	0	0
Menard	7	0	0	0	0	0	0	0	0	0
Midland	0	0	0	0	0	0	0	0	0	0
Milam	0	0	0	0	0	0	0	48	0	0
Mills	0	0	0	0	0	0	0	0	0	0
Mitchell	0	0	0	0	0	0	0	0	0	0
Montague	0	0	0	0	0	0	0	0	0	0
Montgomery	0	0	0	0	18	0	0	0	0	0
Moore	0	0	0	0	0	0	0	0	0	0
Morris	0	0	0	0	0	0	0	0	0	0
Motley	0	0	0	0	0	0	0	0	0	0
Nacogdoches	0	0	0	0	11	0	0	0	0	0
Navarro	0	0	0	0	0	0	0	0	0	0
Nolan	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Golden-cheeked Warbler	Whooping Crane	Piping Plover	Rufa Red Knot	Red-cockaded Woodpecker	Ocelot	Spot-tailed Earless Lizard	Houston Toad	Barton Springs Salamander	Georgetown Salamander
Take Exposure	S/PUM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	S/PUM	S/PUM	SS/PUM + SS/PM	S/PUM	SS/PUM + SS/PM	SS/PUM + SS/PM
Take Likelihood	1	0.1	0.1	0.1	0.5	1	0.1	0.8	1	1
Nueces	0	0	0	0	0	0	12	0	0	0
Ochiltree	0	0	0	0	0	0	0	0	0	0
Oldham	0	0	0	0	0	0	0	0	0	0
Palo Pinto	27	0	0	0	0	0	0	0	0	0
Panola	0	0	0	0	0	0	0	0	0	0
Parker	0	0	0	0	0	0	0	0	0	0
Parmer	0	0	0	0	0	0	0	0	0	0
Pecos	0	0	0	0	0	0	0	0	0	0
Polk	0	0	0	0	2	0	0	0	0	0
Potter	0	0	0	0	0	0	0	0	0	0
Presidio	0	0	0	0	0	0	0	0	0	0
Rains	0	0	0	0	0	0	0	0	0	0
Randall	0	0	0	0	0	0	0	0	0	0
Reagan	0	0	0	0	0	0	12	0	0	0
Real	106	0	0	0	0	0	15	0	0	0
Red River	0	0	0	0	0	0	0	0	0	0
Reeves	0	0	0	0	0	0	0	0	0	0
Refugio	0	1	0	0	0	0	0	0	0	0
Roberts	0	0	0	0	0	0	0	0	0	0
Robertson	0	0	0	0	0	0	0	48	0	0
Rockwall	0	0	0	0	0	0	0	0	0	0
Runnels	0	0	0	0	0	0	11	0	0	0
Rusk	0	0	0	0	0	0	0	0	0	0
San Augustine	0	0	0	0	2	0	0	0	0	0
San Jacinto	0	0	0	0	1	0	0	0	0	0
San Patricio	0	0	0	0	0	0	0	0	0	0
San Saba	38	0	0	0	0	0	0	0	0	0
Schleicher	0	0	0	0	0	0	13	0	0	0
Scurry	0	0	0	0	0	0	0	0	0	0
Shackelford	0	0	0	0	0	0	0	0	0	0
Shelby	0	0	0	0	1	0	0	0	0	0
Smith	0	0	0	0	0	0	0	0	0	0
Somervell	30	0	0	0	0	0	0	0	0	0
Starr	0	0	0	0	0	0	0	0	0	0
Stephens	9	0	0	0	0	0	0	0	0	0
Sterling	0	0	0	0	0	0	8	0	0	0
Stonewall	0	0	0	0	0	0	0	0	0	0
Sutton	0	0	0	0	0	0	10	0	0	0
Swisher	0	0	0	0	0	0	0	0	0	0
Tarrant	0	0	0	0	0	0	0	0	0	0
Taylor	0	0	0	0	0	0	0	0	0	0
Terrell	0	0	0	0	0	0	0	0	0	0
Terry	0	0	0	0	0	0	0	0	0	0
Throckmorton	0	0	0	0	0	0	0	0	0	0
Titus	0	0	0	0	0	0	0	0	0	0
Tom Green	0	0	0	0	0	0	12	0	0	0
Travis	50	0	0	0	0	0	0	0	0	0
Trinity	0	0	0	0	2	0	0	0	0	0
Tyler	0	0	0	0	1	0	0	0	0	0
Upshur	0	0	0	0	0	0	0	0	0	0
Upton	0	0	0	0	0	0	0	0	0	0
Uvalde	34	0	0	0	0	0	0	0	0	0
Val Verde	0	0	0	0	0	0	10	0	0	0
Van Zandt	0	0	0	0	0	0	0	0	0	0
Victoria	0	0	0	0	0	0	0	0	0	0
Walker	0	0	0	0	16	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

Plan Area County Name	Golden-cheeked Warbler	Whooping Crane	Piping Plover	Rufa Red Knot	Red-cockaded Woodpecker	Ocelot	Spot-tailed Earless Lizard	Houston Toad	Barton Springs Salamander	Georgetown Salamander
Take Exposure	S/PUM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	S/PUM	S/PUM	SS/PUM + SS/PM	S/PUM	SS/PUM + SS/PM	SS/PUM + SS/PM
Take Likelihood	1	0.1	0.1	0.1	0.5	1	0.1	0.8	1	1
Waller	0	0	0	0	0	0	0	0	0	0
Ward	0	0	0	0	0	0	0	0	0	0
Washington	0	0	0	0	0	0	0	0	0	0
Webb	0	0	0	0	0	0	0	0	0	0
Wharton	0	0	0	0	0	0	0	0	0	0
Wheeler	0	0	0	0	0	0	0	0	0	0
Wichita	0	0	0	0	0	0	0	0	0	0
Wilbarger	0	0	0	0	0	0	0	0	0	0
Willacy	0	0	2	2	0	11	0	0	0	0
Williamson	25	0	0	0	0	0	0	0	0	0
Wilson	0	0	0	0	0	0	0	0	0	0
Winkler	0	0	0	0	0	0	0	0	0	0
Wise	0	0	0	0	0	0	0	0	0	0
Wood	0	0	0	0	0	0	0	0	0	0
Young	0	0	0	0	0	0	0	0	0	0
Zapata	0	0	0	0	0	0	0	0	0	0
Zavala	0	0	0	0	0	0	0	0	0	0
TOTAL Plan Area	**1,399**	**23**	**7**	**7**	**88**	**25**	**253**	**362**	**0**	**0**

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Jollyville Plateau Salamander	Salado Springs Salamander	San Marcos Salamander	Comal Springs Riffle Beetle	Peck's Cave Amphipod	Bee Creek Cave Harvestman	Tooth Cave Spider	Tooth Cave Ground Beetle	Madla Cave Meshweaver	Government Canyon Bat Cave Spider
Take Exposure	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM
Take Likelihood	1	1	1	1	1	1	1	1	1	1
Anderson	0	0	0	0	0	0	0	0	0	0
Andrews	0	0	0	0	0	0	0	0	0	0
Angelina	0	0	0	0	0	0	0	0	0	0
Aransas	0	0	0	0	0	0	0	0	0	0
Archer	0	0	0	0	0	0	0	0	0	0
Armstrong	0	0	0	0	0	0	0	0	0	0
Atascosa	0	0	0	0	0	0	0	0	0	0
Austin	0	0	0	0	0	0	0	0	0	0
Bandera	0	0	0	0	0	0	0	0	0	0
Bastrop	0	0	0	0	0	0	0	0	0	0
Baylor	0	0	0	0	0	0	0	0	0	0
Bee	0	0	0	0	0	0	0	0	0	0
Bell	0	0	0	0	0	0	0	0	0	0
Bexar	0	0	0	0	0	0	0	0	0	0
Blanco	0	0	0	0	0	2	0	0	0	0
Borden	0	0	0	0	0	0	0	0	0	0
Bosque	0	0	0	0	0	0	0	0	0	0
Bowie	0	0	0	0	0	0	0	0	0	0
Brazoria	0	0	0	0	0	0	0	0	0	0
Brazos	0	0	0	0	0	0	0	0	0	0
Brewster	0	0	0	0	0	0	0	0	0	0
Briscoe	0	0	0	0	0	0	0	0	0	0
Brooks	0	0	0	0	0	0	0	0	0	0
Brown	0	0	0	0	0	0	0	0	0	0
Burleson	0	0	0	0	0	0	0	0	0	0
Burnet	0	0	0	0	0	14	0	0	0	0
Caldwell	0	0	0	0	0	0	0	0	0	0
Calhoun	0	0	0	0	0	0	0	0	0	0
Callahan	0	0	0	0	0	0	0	0	0	0
Cameron	0	0	0	0	0	0	0	0	0	0
Camp	0	0	0	0	0	0	0	0	0	0
Carson	0	0	0	0	0	0	0	0	0	0
Castro	0	0	0	0	0	0	0	0	0	0
Chambers	0	0	0	0	0	0	0	0	0	0
Cherokee	0	0	0	0	0	0	0	0	0	0
Childress	0	0	0	0	0	0	0	0	0	0
Clay	0	0	0	0	0	0	0	0	0	0
Coke	0	0	0	0	0	0	0	0	0	0
Coleman	0	0	0	0	0	0	0	0	0	0
Collin	0	0	0	0	0	0	0	0	0	0
Collingsworth	0	0	0	0	0	0	0	0	0	0
Colorado	0	0	0	0	0	0	0	0	0	0
Comal	0	0	0	0	0	0	0	0	0	0
Comanche	0	0	0	0	0	0	0	0	0	0
Concho	0	0	0	0	0	0	0	0	0	0
Cooke	0	0	0	0	0	0	0	0	0	0
Coryell	0	0	0	0	0	0	0	0	0	0
Cottle	0	0	0	0	0	0	0	0	0	0
Crane	0	0	0	0	0	0	0	0	0	0
Crockett	0	0	0	0	0	0	0	0	0	0
Crosby	0	0	0	0	0	0	0	0	0	0
Culberson	0	0	0	0	0	0	0	0	0	0
Dallas	0	0	0	0	0	0	0	0	0	0
Dawson	0	0	0	0	0	0	0	0	0	0
De Witt	0	0	0	0	0	0	0	0	0	0
Deaf Smith	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Jollyville Plateau Salamander	Salado Springs Salamander	San Marcos Salamander	Comal Springs Riffle Beetle	Peck's Cave Amphipod	Bee Creek Cave Harvestman	Tooth Cave Spider	Tooth Cave Ground Beetle	Madla Cave Meshweaver	Government Canyon Bat Cave Spider
Take Exposure	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM
Take Likelihood	1	1	1	1	1	1	1	1	1	1
Delta	0	0	0	0	0	0	0	0	0	0
Denton	0	0	0	0	0	0	0	0	0	0
Dickens	0	0	0	0	0	0	0	0	0	0
Dimmit	0	0	0	0	0	0	0	0	0	0
Donley	0	0	0	0	0	0	0	0	0	0
Duval	0	0	0	0	0	0	0	0	0	0
Eastland	0	0	0	0	0	0	0	0	0	0
Ector	0	0	0	0	0	0	0	0	0	0
Edwards	0	0	0	0	0	0	0	0	0	0
Ellis	0	0	0	0	0	0	0	0	0	0
Erath	0	0	0	0	0	0	0	0	0	0
Falls	0	0	0	0	0	0	0	0	0	0
Fannin	0	0	0	0	0	0	0	0	0	0
Fayette	0	0	0	0	0	0	0	0	0	0
Fisher	0	0	0	0	0	0	0	0	0	0
Floyd	0	0	0	0	0	0	0	0	0	0
Foard	0	0	0	0	0	0	0	0	0	0
Fort Bend	0	0	0	0	0	0	0	0	0	0
Franklin	0	0	0	0	0	0	0	0	0	0
Freestone	0	0	0	0	0	0	0	0	0	0
Frio	0	0	0	0	0	0	0	0	0	0
Gaines	0	0	0	0	0	0	0	0	0	0
Galveston	0	0	0	0	0	0	0	0	0	0
Garza	0	0	0	0	0	0	0	0	0	0
Gillespie	0	0	0	0	0	0	0	0	0	0
Glasscock	0	0	0	0	0	0	0	0	0	0
Goliad	0	0	0	0	0	0	0	0	0	0
Gonzales	0	0	0	0	0	0	0	0	0	0
Gray	0	0	0	0	0	0	0	0	0	0
Grayson	0	0	0	0	0	0	0	0	0	0
Gregg	0	0	0	0	0	0	0	0	0	0
Grimes	0	0	0	0	0	0	0	0	0	0
Guadalupe	0	0	0	0	0	0	0	0	0	0
Hale	0	0	0	0	0	0	0	0	0	0
Hall	0	0	0	0	0	0	0	0	0	0
Hamilton	0	0	0	0	0	0	0	0	0	0
Hansford	0	0	0	0	0	0	0	0	0	0
Hardeman	0	0	0	0	0	0	0	0	0	0
Harris	0	0	0	0	0	0	0	0	0	0
Harrison	0	0	0	0	0	0	0	0	0	0
Hartley	0	0	0	0	0	0	0	0	0	0
Haskell	0	0	0	0	0	0	0	0	0	0
Hays	0	0	0	0	0	0	0	0	0	0
Hemphill	0	0	0	0	0	0	0	0	0	0
Henderson	0	0	0	0	0	0	0	0	0	0
Hidalgo	0	0	0	0	0	0	0	0	0	0
Hill	0	0	0	0	0	0	0	0	0	0
Hood	0	0	0	0	0	0	0	0	0	0
Hopkins	0	0	0	0	0	0	0	0	0	0
Houston	0	0	0	0	0	0	0	0	0	0
Howard	0	0	0	0	0	0	0	0	0	0
Hudspeth	0	0	0	0	0	0	0	0	0	0
Hunt	0	0	0	0	0	0	0	0	0	0
Hutchinson	0	0	0	0	0	0	0	0	0	0
Irion	0	0	0	0	0	0	0	0	0	0
Jack	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Jollyville Plateau Salamander	Salado Springs Salamander	San Marcos Salamander	Comal Springs Riffle Beetle	Peck's Cave Amphipod	Bee Creek Cave Harvestman	Tooth Cave Spider	Tooth Cave Ground Beetle	Madla Cave Meshweaver	Government Canyon Bat Cave Spider
Take Exposure	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM
Take Likelihood	1	1	1	1	1	1	1	1	1	1
Jackson	0	0	0	0	0	0	0	0	0	0
Jasper	0	0	0	0	0	0	0	0	0	0
Jeff Davis	0	0	0	0	0	0	0	0	0	0
Jefferson	0	0	0	0	0	0	0	0	0	0
Jim Hogg	0	0	0	0	0	0	0	0	0	0
Jim Wells	0	0	0	0	0	0	0	0	0	0
Johnson	0	0	0	0	0	0	0	0	0	0
Jones	0	0	0	0	0	0	0	0	0	0
Karnes	0	0	0	0	0	0	0	0	0	0
Kaufman	0	0	0	0	0	0	0	0	0	0
Kendall	0	0	0	0	0	0	0	0	0	0
Kenedy	0	0	0	0	0	0	0	0	0	0
Kent	0	0	0	0	0	0	0	0	0	0
Kerr	0	0	0	0	0	0	0	0	0	0
Kimble	0	0	0	0	0	0	0	0	0	0
King	0	0	0	0	0	0	0	0	0	0
Kinney	0	0	0	0	0	0	0	0	0	0
Kleberg	0	0	0	0	0	0	0	0	0	0
Knox	0	0	0	0	0	0	0	0	0	0
La Salle	0	0	0	0	0	0	0	0	0	0
Lamar	0	0	0	0	0	0	0	0	0	0
Lamb	0	0	0	0	0	0	0	0	0	0
Lampasas	0	0	0	0	0	0	0	0	0	0
Lavaca	0	0	0	0	0	0	0	0	0	0
Lee	0	0	0	0	0	0	0	0	0	0
Leon	0	0	0	0	0	0	0	0	0	0
Liberty	0	0	0	0	0	0	0	0	0	0
Limestone	0	0	0	0	0	0	0	0	0	0
Lipscomb	0	0	0	0	0	0	0	0	0	0
Live Oak	0	0	0	0	0	0	0	0	0	0
Llano	0	0	0	0	0	0	0	0	0	0
Loving	0	0	0	0	0	0	0	0	0	0
Lubbock	0	0	0	0	0	0	0	0	0	0
Lynn	0	0	0	0	0	0	0	0	0	0
Madison	0	0	0	0	0	0	0	0	0	0
Martin	0	0	0	0	0	0	0	0	0	0
Mason	0	0	0	0	0	0	0	0	0	0
Matagorda	0	0	0	0	0	0	0	0	0	0
Maverick	0	0	0	0	0	0	0	0	0	0
Mcculloch	0	0	0	0	0	0	0	0	0	0
Mclennan	0	0	0	0	0	0	0	0	0	0
Mcmullen	0	0	0	0	0	0	0	0	0	0
Medina	0	0	0	0	0	0	0	0	5	5
Menard	0	0	0	0	0	0	0	0	0	0
Midland	0	0	0	0	0	0	0	0	0	0
Milam	0	0	0	0	0	0	0	0	0	0
Mills	0	0	0	0	0	0	0	0	0	0
Mitchell	0	0	0	0	0	0	0	0	0	0
Montague	0	0	0	0	0	0	0	0	0	0
Montgomery	0	0	0	0	0	0	0	0	0	0
Moore	0	0	0	0	0	0	0	0	0	0
Morris	0	0	0	0	0	0	0	0	0	0
Motley	0	0	0	0	0	0	0	0	0	0
Nacogdoches	0	0	0	0	0	0	0	0	0	0
Navarro	0	0	0	0	0	0	0	0	0	0
Nolan	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Jollyville Plateau Salamander	Salado Springs Salamander	San Marcos Salamander	Comal Springs Riffle Beetle	Peck's Cave Amphipod	Bee Creek Cave Harvestman	Tooth Cave Spider	Tooth Cave Ground Beetle	Madla Cave Meshweaver	Government Canyon Bat Cave Spider
Take Exposure	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM
Take Likelihood	1	1	1	1	1	1	1	1	1	1
Nueces	0	0	0	0	0	0	0	0	0	0
Ochiltree	0	0	0	0	0	0	0	0	0	0
Oldham	0	0	0	0	0	0	0	0	0	0
Palo Pinto	0	0	0	0	0	0	0	0	0	0
Panola	0	0	0	0	0	0	0	0	0	0
Parker	0	0	0	0	0	0	0	0	0	0
Parmer	0	0	0	0	0	0	0	0	0	0
Pecos	0	0	0	0	0	0	0	0	0	0
Polk	0	0	0	0	0	0	0	0	0	0
Potter	0	0	0	0	0	0	0	0	0	0
Presidio	0	0	0	0	0	0	0	0	0	0
Rains	0	0	0	0	0	0	0	0	0	0
Randall	0	0	0	0	0	0	0	0	0	0
Reagan	0	0	0	0	0	0	0	0	0	0
Real	0	0	0	0	0	0	0	0	0	0
Red River	0	0	0	0	0	0	0	0	0	0
Reeves	0	0	0	0	0	0	0	0	0	0
Refugio	0	0	0	0	0	0	0	0	0	0
Roberts	0	0	0	0	0	0	0	0	0	0
Robertson	0	0	0	0	0	0	0	0	0	0
Rockwall	0	0	0	0	0	0	0	0	0	0
Runnels	0	0	0	0	0	0	0	0	0	0
Rusk	0	0	0	0	0	0	0	0	0	0
San Augustine	0	0	0	0	0	0	0	0	0	0
San Jacinto	0	0	0	0	0	0	0	0	0	0
San Patricio	0	0	0	0	0	0	0	0	0	0
San Saba	0	0	0	0	0	0	0	0	0	0
Schleicher	0	0	0	0	0	0	0	0	0	0
Scurry	0	0	0	0	0	0	0	0	0	0
Shackelford	0	0	0	0	0	0	0	0	0	0
Shelby	0	0	0	0	0	0	0	0	0	0
Smith	0	0	0	0	0	0	0	0	0	0
Somervell	0	0	0	0	0	0	0	0	0	0
Starr	0	0	0	0	0	0	0	0	0	0
Stephens	0	0	0	0	0	0	0	0	0	0
Sterling	0	0	0	0	0	0	0	0	0	0
Stonewall	0	0	0	0	0	0	0	0	0	0
Sutton	0	0	0	0	0	0	0	0	0	0
Swisher	0	0	0	0	0	0	0	0	0	0
Tarrant	0	0	0	0	0	0	0	0	0	0
Taylor	0	0	0	0	0	0	0	0	0	0
Terrell	0	0	0	0	0	0	0	0	0	0
Terry	0	0	0	0	0	0	0	0	0	0
Throckmorton	0	0	0	0	0	0	0	0	0	0
Titus	0	0	0	0	0	0	0	0	0	0
Tom Green	0	0	0	0	0	0	0	0	0	0
Travis	1	0	0	0	0	52	3	4	0	0
Trinity	0	0	0	0	0	0	0	0	0	0
Tyler	0	0	0	0	0	0	0	0	0	0
Upshur	0	0	0	0	0	0	0	0	0	0
Upton	0	0	0	0	0	0	0	0	0	0
Uvalde	0	0	0	0	0	0	0	0	0	0
Val Verde	0	0	0	0	0	0	0	0	0	0
Van Zandt	0	0	0	0	0	0	0	0	0	0
Victoria	0	0	0	0	0	0	0	0	0	0
Walker	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Jollyville Plateau Salamander	Salado Springs Salamander	San Marcos Salamander	Comal Springs Riffle Beetle	Peck's Cave Amphipod	Bee Creek Cave Harvestman	Tooth Cave Spider	Tooth Cave Ground Beetle	Madla Cave Meshweaver	Government Canyon Bat Cave Spider
Take Exposure	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PUM + SS/PM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM
Take Likelihood	1	1	1	1	1	1	1	1	1	1
Waller	0	0	0	0	0	0	0	0	0	0
Ward	0	0	0	0	0	0	0	0	0	0
Washington	0	0	0	0	0	0	0	0	0	0
Webb	0	0	0	0	0	0	0	0	0	0
Wharton	0	0	0	0	0	0	0	0	0	0
Wheeler	0	0	0	0	0	0	0	0	0	0
Wichita	0	0	0	0	0	0	0	0	0	0
Wilbarger	0	0	0	0	0	0	0	0	0	0
Willacy	0	0	0	0	0	0	0	0	0	0
Williamson	0	0	0	0	0	0	2	3	0	0
Wilson	0	0	0	0	0	0	0	0	0	0
Winkler	0	0	0	0	0	0	0	0	0	0
Wise	0	0	0	0	0	0	0	0	0	0
Wood	0	0	0	0	0	0	0	0	0	0
Young	0	0	0	0	0	0	0	0	0	0
Zapata	0	0	0	0	0	0	0	0	0	0
Zavala	0	0	0	0	0	0	0	0	0	0
TOTAL Plan Area	**1**	**0**	**0**	**0**	**0**	**68**	**5**	**7**	**5**	**5**

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
Take Exposure	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM
Take Likelihood	1	1	1
Anderson	0	0	0
Andrews	0	0	0
Angelina	0	0	0
Aransas	0	0	0
Archer	0	0	0
Armstrong	0	0	0
Atascosa	0	0	0
Austin	0	0	0
Bandera	0	0	0
Bastrop	0	0	0
Baylor	0	0	0
Bee	0	0	0
Bell	0	0	0
Bexar	0	0	0
Blanco	0	0	0
Borden	0	0	0
Bosque	0	0	0
Bowie	0	0	0
Brazoria	0	0	0
Brazos	0	0	0
Brewster	0	0	0
Briscoe	0	0	0
Brooks	0	0	0
Brown	0	0	0
Burleson	0	0	0
Burnet	0	0	0
Caldwell	0	0	0
Calhoun	0	0	0
Callahan	0	0	0
Cameron	0	0	0
Camp	0	0	0
Carson	0	0	0
Castro	0	0	0
Chambers	0	0	0
Cherokee	0	0	0
Childress	0	0	0
Clay	0	0	0
Coke	0	0	0
Coleman	0	0	0
Collin	0	0	0
Collingsworth	0	0	0
Colorado	0	0	0
Comal	0	0	0
Comanche	0	0	0
Concho	0	0	0
Cooke	0	0	0
Coryell	0	0	0
Cottle	0	0	0
Crane	0	0	0
Crockett	0	0	0
Crosby	0	0	0
Culberson	0	0	0
Dallas	0	0	0
Dawson	0	0	0
De Witt	0	0	0
Deaf Smith	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
Take Exposure	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM
Take Likelihood	1	1	1
Delta	0	0	0
Denton	0	0	0
Dickens	0	0	0
Dimmit	0	0	0
Donley	0	0	0
Duval	0	0	0
Eastland	0	0	0
Ector	0	0	0
Edwards	0	0	0
Ellis	0	0	0
Erath	0	0	0
Falls	0	0	0
Fannin	0	0	0
Fayette	0	0	0
Fisher	0	0	0
Floyd	0	0	0
Foard	0	0	0
Fort Bend	0	0	0
Franklin	0	0	0
Freestone	0	0	0
Frio	0	0	0
Gaines	0	0	0
Galveston	0	0	0
Garza	0	0	0
Gillespie	0	0	0
Glasscock	0	0	0
Goliad	0	0	0
Gonzales	0	0	0
Gray	0	0	0
Grayson	0	0	0
Gregg	0	0	0
Grimes	0	0	0
Guadalupe	0	0	0
Hale	0	0	0
Hall	0	0	0
Hamilton	0	0	0
Hansford	0	0	0
Hardeman	0	0	0
Harris	0	0	0
Harrison	0	0	0
Hartley	0	0	0
Haskell	0	0	0
Hays	0	0	0
Hemphill	0	0	0
Henderson	0	0	0
Hidalgo	0	0	0
Hill	0	0	0
Hood	0	0	0
Hopkins	0	0	0
Houston	0	0	0
Howard	0	0	0
Hudspeth	0	0	0
Hunt	0	0	0
Hutchinson	0	0	0
Irion	0	0	0
Jack	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
Take Exposure	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM
Take Likelihood	1	1	1
Jackson	0	0	0
Jasper	0	0	0
Jeff Davis	0	0	0
Jefferson	0	0	0
Jim Hogg	0	0	0
Jim Wells	0	0	0
Johnson	0	0	0
Jones	0	0	0
Karnes	0	0	0
Kaufman	0	0	0
Kendall	0	0	0
Kenedy	0	0	0
Kent	0	0	0
Kerr	0	0	0
Kimble	0	0	0
King	0	0	0
Kinney	0	0	0
Kleberg	0	0	0
Knox	0	0	0
La Salle	0	0	0
Lamar	0	0	0
Lamb	0	0	0
Lampasas	0	0	0
Lavaca	0	0	0
Lee	0	0	0
Leon	0	0	0
Liberty	0	0	0
Limestone	0	0	0
Lipscomb	0	0	0
Live Oak	0	0	0
Llano	0	0	0
Loving	0	0	0
Lubbock	0	0	0
Lynn	0	0	0
Madison	0	0	0
Martin	0	0	0
Mason	0	0	0
Matagorda	0	0	0
Maverick	0	0	0
Mcculloch	0	0	0
Mclennan	0	0	0
Mcmullen	0	0	0
Medina	5	5	5
Menard	0	0	0
Midland	0	0	0
Milam	0	0	0
Mills	0	0	0
Mitchell	0	0	0
Montague	0	0	0
Montgomery	0	0	0
Moore	0	0	0
Morris	0	0	0
Motley	0	0	0
Nacogdoches	0	0	0
Navarro	0	0	0
Nolan	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
Take Exposure	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM
Take Likelihood	1	1	1
Nueces	0	0	0
Ochiltree	0	0	0
Oldham	0	0	0
Palo Pinto	0	0	0
Panola	0	0	0
Parker	0	0	0
Parmer	0	0	0
Pecos	0	0	0
Polk	0	0	0
Potter	0	0	0
Presidio	0	0	0
Rains	0	0	0
Randall	0	0	0
Reagan	0	0	0
Real	0	0	0
Red River	0	0	0
Reeves	0	0	0
Refugio	0	0	0
Roberts	0	0	0
Robertson	0	0	0
Rockwall	0	0	0
Runnels	0	0	0
Rusk	0	0	0
San Augustine	0	0	0
San Jacinto	0	0	0
San Patricio	0	0	0
San Saba	0	0	0
Schleicher	0	0	0
Scurry	0	0	0
Shackelford	0	0	0
Shelby	0	0	0
Smith	0	0	0
Somervell	0	0	0
Starr	0	0	0
Stephens	0	0	0
Sterling	0	0	0
Stonewall	0	0	0
Sutton	0	0	0
Swisher	0	0	0
Tarrant	0	0	0
Taylor	0	0	0
Terrell	0	0	0
Terry	0	0	0
Throckmorton	0	0	0
Titus	0	0	0
Tom Green	0	0	0
Travis	0	0	0
Trinity	0	0	0
Tyler	0	0	0
Upshur	0	0	0
Upton	0	0	0
Uvalde	0	0	0
Val Verde	0	0	0
Van Zandt	0	0	0
Victoria	0	0	0
Walker	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Direct Habitat Modification from Covered Activities

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
Take Exposure	SS/PM + SS/PUM	SS/PM + SS/PUM	SS/PM + SS/PUM
Take Likelihood	1	1	1
Waller	0	0	0
Ward	0	0	0
Washington	0	0	0
Webb	0	0	0
Wharton	0	0	0
Wheeler	0	0	0
Wichita	0	0	0
Wilbarger	0	0	0
Willacy	0	0	0
Williamson	0	0	0
Wilson	0	0	0
Winkler	0	0	0
Wise	0	0	0
Wood	0	0	0
Young	0	0	0
Zapata	0	0	0
Zavala	0	0	0
TOTAL Plan Area	**5**	**5**	**5**

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Golden-cheeked Warbler	Whooping Crane	Piping Plover	Rufa Red Knot	Red-cockaded Woodpecker	Ocelot	Spot-tailed Earless Lizard	Houston Toad	Barton Springs Salamander	Georgetown Salamander
Take Exposure	S/PUM-Adj 300 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 300 ft	S/PUM-Adj 500 ft	S/PUM + S/PM	S/PUM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft
Take Likelihood	1	0.5	0.1	0.1	0.5	1	0.1	0.8	1	1
Adjacent Factor	5	16.67	16.67	16.67	5	8.33	1	1.83	1.83	1.83
Anderson	0	0	0	0	0	0	0	0	0	0
Andrews	0	0	0	0	0	0	0	0	0	0
Angelina	0	0	0	0	60	0	0	0	0	0
Aransas	0	940	16	16	0	0	0	0	0	0
Archer	0	0	0	0	0	0	0	0	0	0
Armstrong	0	0	0	0	0	0	0	0	0	0
Atascosa	0	0	0	0	0	0	0	0	0	0
Austin	0	0	0	0	0	0	0	38	0	0
Bandera	488	0	0	0	0	0	0	0	0	0
Bastrop	0	0	0	0	0	0	0	117	0	0
Baylor	0	0	0	0	0	0	0	0	0	0
Bee	0	0	0	0	0	0	0	0	0	0
Bell	128	0	0	0	0	0	0	0	0	0
Bexar	131	0	0	0	0	0	0	0	0	0
Blanco	291	0	0	0	0	0	0	0	0	0
Borden	0	0	0	0	0	0	0	0	0	0
Bosque	194	0	0	0	0	0	0	0	0	0
Bowie	0	0	0	0	0	0	0	0	0	0
Brazoria	0	0	0	0	0	0	0	0	0	0
Brazos	0	0	0	0	0	0	0	0	0	0
Brewster	0	0	0	0	0	0	0	0	0	0
Briscoe	0	0	0	0	0	0	0	0	0	0
Brooks	0	0	0	0	0	0	0	0	0	0
Brown	0	0	0	0	0	0	0	0	0	0
Burleson	0	0	0	0	0	0	0	54	0	0
Burnet	379	0	0	0	0	0	0	0	0	0
Caldwell	0	0	0	0	0	0	0	0	0	0
Calhoun	0	651	2	2	0	0	0	0	0	0
Callahan	0	0	0	0	0	0	0	0	0	0
Cameron	0	0	27	27	0	72	0	0	0	0
Camp	0	0	0	0	0	0	0	0	0	0
Carson	0	0	0	0	0	0	0	0	0	0
Castro	0	0	0	0	0	0	0	0	0	0
Chambers	0	0	0	0	0	0	0	0	0	0
Cherokee	0	0	0	0	49	0	0	0	0	0
Childress	0	0	0	0	0	0	0	0	0	0
Clay	0	0	0	0	0	0	0	0	0	0
Coke	0	0	0	0	0	0	88	0	0	0
Coleman	0	0	0	0	0	0	0	0	0	0
Collin	0	0	0	0	0	0	0	0	0	0
Collingsworth	0	0	0	0	0	0	0	0	0	0
Colorado	0	0	0	0	0	0	0	57	0	0
Comal	452	0	0	0	0	0	0	0	0	0
Comanche	0	0	0	0	0	0	0	0	0	0
Concho	0	0	0	0	0	0	73	0	0	0
Cooke	0	0	0	0	0	0	0	0	0	0
Coryell	225	0	0	0	0	0	0	0	0	0
Cottle	0	0	0	0	0	0	0	0	0	0
Crane	0	0	0	0	0	0	0	0	0	0
Crockett	0	0	0	0	0	0	59	0	0	0
Crosby	0	0	0	0	0	0	0	0	0	0
Culberson	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Golden-cheeked Warbler	Whooping Crane	Piping Plover	Rufa Red Knot	Red-cockaded Woodpecker	Ocelot	Spot-tailed Earless Lizard	Houston Toad	Barton Springs Salamander	Georgetown Salamander
Take Exposure	S/PUM-Adj 300 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 300 ft	S/PUM-Adj 500 ft	S/PUM + S/PM	S/PUM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft
Take Likelihood	1	0.5	0.1	0.1	0.5	1	0.1	0.8	1	1
Adjacent Factor	5	16.67	16.67	16.67	5	8.33	1	1.83	1.83	1.83
Dallas	0	0	0	0	0	0	0	0	0	0
Dawson	0	0	0	0	0	0	0	0	0	0
De Witt	0	0	0	0	0	0	0	0	0	0
Deaf Smith	0	0	0	0	0	0	0	0	0	0
Delta	0	0	0	0	0	0	0	0	0	0
Denton	0	0	0	0	0	0	0	0	0	0
Dickens	0	0	0	0	0	0	0	0	0	0
Dimmit	0	0	0	0	0	0	0	0	0	0
Donley	0	0	0	0	0	0	0	0	0	0
Duval	0	0	0	0	0	0	0	0	0	0
Eastland	71	0	0	0	0	0	0	0	0	0
Ector	0	0	0	0	0	0	0	0	0	0
Edwards	198	0	0	0	0	0	57	0	0	0
Ellis	0	0	0	0	0	0	0	0	0	0
Erath	158	0	0	0	0	0	0	0	0	0
Falls	0	0	0	0	0	0	0	0	0	0
Fannin	0	0	0	0	0	0	0	0	0	0
Fayette	0	0	0	0	0	0	0	0	0	0
Fisher	0	0	0	0	0	0	0	0	0	0
Floyd	0	0	0	0	0	0	0	0	0	0
Foard	0	0	0	0	0	0	0	0	0	0
Fort Bend	0	0	0	0	0	0	0	0	0	0
Franklin	0	0	0	0	0	0	0	0	0	0
Freestone	0	0	0	0	0	0	0	0	0	0
Frio	0	0	0	0	0	0	0	0	0	0
Gaines	0	0	0	0	0	0	0	0	0	0
Galveston	0	0	2	2	0	0	0	0	0	0
Garza	0	0	0	0	0	0	0	0	0	0
Gillespie	248	0	0	0	0	0	0	0	0	0
Glasscock	0	0	0	0	0	0	70	0	0	0
Goliad	0	0	0	0	0	0	0	0	0	0
Gonzales	0	0	0	0	0	0	0	0	0	0
Gray	0	0	0	0	0	0	0	0	0	0
Grayson	0	0	0	0	0	0	0	0	0	0
Gregg	0	0	0	0	0	0	0	0	0	0
Grimes	0	0	0	0	0	0	0	0	0	0
Guadalupe	0	0	0	0	0	0	0	0	0	0
Hale	0	0	0	0	0	0	0	0	0	0
Hall	0	0	0	0	0	0	0	0	0	0
Hamilton	137	0	0	0	0	0	0	0	0	0
Hansford	0	0	0	0	0	0	0	0	0	0
Hardeman	0	0	0	0	0	0	0	0	0	0
Harris	0	0	0	0	0	0	0	0	0	0
Harrison	0	0	0	0	0	0	0	0	0	0
Hartley	0	0	0	0	0	0	0	0	0	0
Haskell	0	0	0	0	0	0	0	0	0	0
Hays	402	0	0	0	0	0	0	0	3	0
Hemphill	0	0	0	0	0	0	0	0	0	0
Henderson	0	0	0	0	0	0	0	0	0	0
Hidalgo	0	0	0	0	0	0	0	0	0	0
Hill	12	0	0	0	0	0	0	0	0	0
Hood	72	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Golden-cheeked Warbler	Whooping Crane	Piping Plover	Rufa Red Knot	Red-cockaded Woodpecker	Ocelot	Spot-tailed Earless Lizard	Houston Toad	Barton Springs Salamander	Georgetown Salamander
Take Exposure	S/PUM-Adj 300 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 300 ft	S/PUM-Adj 500 ft	S/PUM + S/PM	S/PUM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft
Take Likelihood	1	0.5	0.1	0.1	0.5	1	0.1	0.8	1	1
Adjacent Factor	5	16.67	16.67	16.67	5	8.33	1	1.83	1.83	1.83
Hopkins	0	0	0	0	0	0	0	0	0	0
Houston	0	0	0	0	57	0	0	0	0	0
Howard	0	0	0	0	0	0	0	0	0	0
Hudspeth	0	0	0	0	0	0	0	0	0	0
Hunt	0	0	0	0	0	0	0	0	0	0
Hutchinson	0	0	0	0	0	0	0	0	0	0
Irion	0	0	0	0	0	0	51	0	0	0
Jack	0	0	0	0	0	0	0	0	0	0
Jackson	0	69	0	0	0	0	0	0	0	0
Jasper	0	0	0	0	7	0	0	0	0	0
Jeff Davis	0	0	0	0	0	0	0	0	0	0
Jefferson	0	0	0	0	0	0	0	0	0	0
Jim Hogg	0	0	0	0	0	0	0	0	0	0
Jim Wells	0	0	0	0	0	0	26	0	0	0
Johnson	19	0	0	0	0	0	0	0	0	0
Jones	0	0	0	0	0	0	0	0	0	0
Karnes	0	0	0	0	0	0	0	0	0	0
Kaufman	0	0	0	0	0	0	0	0	0	0
Kendall	342	0	0	0	0	0	0	0	0	0
Kenedy	0	0	38	38	0	38	0	0	0	0
Kent	0	0	0	0	0	0	0	0	0	0
Kerr	378	0	0	0	0	0	65	0	0	0
Kimble	247	0	0	0	0	0	0	0	0	0
King	0	0	0	0	0	0	0	0	0	0
Kinney	51	0	0	0	0	0	79	0	0	0
Kleberg	0	0	4	4	0	0	0	0	0	0
Knox	0	0	0	0	0	0	0	0	0	0
La Salle	0	0	0	0	0	0	0	0	0	0
Lamar	0	0	0	0	0	0	0	0	0	0
Lamb	0	0	0	0	0	0	0	0	0	0
Lampasas	220	0	0	0	0	0	0	0	0	0
Lavaca	0	0	0	0	0	0	0	95	0	0
Lee	0	0	0	0	0	0	0	104	0	0
Leon	0	0	0	0	0	0	0	22	0	0
Liberty	0	0	0	0	2	0	0	0	0	0
Limestone	0	0	0	0	0	0	0	0	0	0
Lipscomb	0	0	0	0	0	0	0	0	0	0
Live Oak	0	0	0	0	0	0	0	0	0	0
Llano	181	0	0	0	0	0	0	0	0	0
Loving	0	0	0	0	0	0	0	0	0	0
Lubbock	0	0	0	0	0	0	0	0	0	0
Lynn	0	0	0	0	0	0	0	0	0	0
Madison	0	0	0	0	0	0	0	0	0	0
Martin	0	0	0	0	0	0	0	0	0	0
Mason	166	0	0	0	0	0	118	0	0	0
Matagorda	0	125	1	1	0	0	0	0	0	0
Maverick	0	0	0	0	0	0	107	0	0	0
Mcculloch	0	0	0	0	0	0	93	0	0	0
Mclennan	27	0	0	0	0	0	0	0	0	0
Mcmullen	0	0	0	0	0	0	0	0	0	0
Medina	155	0	0	0	0	0	0	0	0	0
Menard	35	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Golden-cheeked Warbler	Whooping Crane	Piping Plover	Rufa Red Knot	Red-cockaded Woodpecker	Ocelot	Spot-tailed Earless Lizard	Houston Toad	Barton Springs Salamander	Georgetown Salamander
Take Exposure	S/PUM-Adj 300 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 300 ft	S/PUM-Adj 500 ft	S/PUM + S/PM	S/PUM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft
Take Likelihood	1	0.5	0.1	0.1	0.5	1	0.1	0.8	1	1
Adjacent Factor	5	16.67	16.67	16.67	5	8.33	1	1.83	1.83	1.83
Midland	0	0	0	0	0	0	0	0	0	0
Milam	0	0	0	0	0	0	0	88	0	0
Mills	0	0	0	0	0	0	0	0	0	0
Mitchell	0	0	0	0	0	0	0	0	0	0
Montague	0	0	0	0	0	0	0	0	0	0
Montgomery	0	0	0	0	88	0	0	0	0	0
Moore	0	0	0	0	0	0	0	0	0	0
Morris	0	0	0	0	0	0	0	0	0	0
Motley	0	0	0	0	0	0	0	0	0	0
Nacogdoches	0	0	0	0	53	0	0	0	0	0
Navarro	0	0	0	0	0	0	0	0	0	0
Nolan	0	0	0	0	0	0	0	0	0	0
Nueces	0	10	3	3	0	0	73	0	0	0
Ochiltree	0	0	0	0	0	0	0	0	0	0
Oldham	0	0	0	0	0	0	0	0	0	0
Palo Pinto	133	0	0	0	0	0	0	0	0	0
Panola	0	0	0	0	0	0	0	0	0	0
Parker	0	0	0	0	0	0	0	0	0	0
Parmer	0	0	0	0	0	0	0	0	0	0
Pecos	0	0	0	0	0	0	0	0	0	0
Polk	0	0	0	0	8	0	0	0	0	0
Potter	0	0	0	0	0	0	0	0	0	0
Presidio	0	0	0	0	0	0	0	0	0	0
Rains	0	0	0	0	0	0	0	0	0	0
Randall	0	0	0	0	0	0	0	0	0	0
Reagan	0	0	0	0	0	0	72	0	0	0
Real	531	0	0	0	0	0	90	0	0	0
Red River	0	0	0	0	0	0	0	0	0	0
Reeves	0	0	0	0	0	0	0	0	0	0
Refugio	0	86	0	0	0	0	0	0	0	0
Roberts	0	0	0	0	0	0	0	0	0	0
Robertson	0	0	0	0	0	0	0	87	0	0
Rockwall	0	0	0	0	0	0	0	0	0	0
Runnels	0	0	0	0	0	0	66	0	0	0
Rusk	0	0	0	0	0	0	0	0	0	0
San Augustine	0	0	0	0	8	0	0	0	0	0
San Jacinto	0	0	0	0	7	0	0	0	0	0
San Patricio	0	39	0	0	0	0	0	0	0	0
San Saba	189	0	0	0	0	0	0	0	0	0
Schleicher	0	0	0	0	0	0	75	0	0	0
Scurry	0	0	0	0	0	0	0	0	0	0
Shackelford	0	0	0	0	0	0	0	0	0	0
Shelby	0	0	0	0	6	0	0	0	0	0
Smith	0	0	0	0	0	0	0	0	0	0
Somervell	151	0	0	0	0	0	0	0	0	0
Starr	0	0	0	0	0	0	0	0	0	0
Stephens	46	0	0	0	0	0	0	0	0	0
Sterling	0	0	0	0	0	0	50	0	0	0
Stonewall	0	0	0	0	0	0	0	0	0	0
Sutton	0	0	0	0	0	0	57	0	0	0
Swisher	0	0	0	0	0	0	0	0	0	0
Tarrant	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Golden-cheeked Warbler	Whooping Crane	Piping Plover	Rufa Red Knot	Red-cockaded Woodpecker	Ocelot	Spot-tailed Earless Lizard	Houston Toad	Barton Springs Salamander	Georgetown Salamander
Take Exposure	S/PUM-Adj 300 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 1,000 ft	S/PUM-Adj 300 ft	S/PUM-Adj 500 ft	S/PUM + S/PM	S/PUM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft
Take Likelihood	1	0.5	0.1	0.1	0.5	1	0.1	0.8	1	1
Adjacent Factor	5	16.67	16.67	16.67	5	8.33	1	1.83	1.83	1.83
Taylor	0	0	0	0	0	0	0	0	0	0
Terrell	0	0	0	0	0	0	0	0	0	0
Terry	0	0	0	0	0	0	0	0	0	0
Throckmorton	0	0	0	0	0	0	0	0	0	0
Titus	0	0	0	0	0	0	0	0	0	0
Tom Green	0	0	0	0	0	0	69	0	0	0
Travis	248	0	0	0	0	0	0	0	2	0
Trinity	0	0	0	0	10	0	0	0	0	0
Tyler	0	0	0	0	7	0	0	0	0	0
Upshur	0	0	0	0	0	0	0	0	0	0
Upton	0	0	0	0	0	0	0	0	0	0
Uvalde	169	0	0	0	0	0	0	0	0	0
Val Verde	0	0	0	0	0	0	59	0	0	0
Van Zandt	0	0	0	0	0	0	0	0	0	0
Victoria	0	30	0	0	0	0	0	0	0	0
Walker	0	0	0	0	78	0	0	0	0	0
Waller	0	0	0	0	0	0	0	0	0	0
Ward	0	0	0	0	0	0	0	0	0	0
Washington	0	0	0	0	0	0	0	0	0	0
Webb	0	0	0	0	0	0	0	0	0	0
Wharton	0	0	0	0	0	0	0	0	0	0
Wheeler	0	0	0	0	0	0	0	0	0	0
Wichita	0	0	0	0	0	0	0	0	0	0
Wilbarger	0	0	0	0	0	0	0	0	0	0
Willacy	0	0	29	29	0	95	0	0	0	0
Williamson	123	0	0	0	0	0	0	0	0	3
Wilson	0	0	0	0	0	0	0	0	0	0
Winkler	0	0	0	0	0	0	0	0	0	0
Wise	0	0	0	0	0	0	0	0	0	0
Wood	0	0	0	0	0	0	0	0	0	0
Young	0	0	0	0	0	0	0	0	0	0
Zapata	0	0	0	0	0	0	0	0	0	0
Zavala	0	0	0	0	0	0	0	0	0	0
TOTAL Plan Area	**6,997**	**1,950**	**122**	**122**	**440**	**205**	**1,497**	**662**	**5**	**3**
Direct + Indirect Take	**8,396**	**1,973**	**129**	**129**	**528**	**230**	**1,750**	**1,024**	**5**	**3**

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Jollyville Plateau Salamander	Salado Springs Salamander	San Marcos Salamander	Comal Springs Riffle Beetle	Peck's Cave Amphipod	Bee Creek Cave Harvestman	Tooth Cave Spider	Tooth Cave Ground Beetle	Madla Cave Meshweaver	Government Canyon Bat Cave Spider
Take Exposure	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM	S/PUM	S/PUM	S/PUM	S/PUM
Take Likelihood	1	1	1	1	1	0.3	1	1	1	1
Adjacent Factor	1.83	1.83	1.83	1.83	1.83	1	1	1	1	1
Anderson	0	0	0	0	0	0	0	0	0	0
Andrews	0	0	0	0	0	0	0	0	0	0
Angelina	0	0	0	0	0	0	0	0	0	0
Aransas	0	0	0	0	0	0	0	0	0	0
Archer	0	0	0	0	0	0	0	0	0	0
Armstrong	0	0	0	0	0	0	0	0	0	0
Atascosa	0	0	0	0	0	0	0	0	0	0
Austin	0	0	0	0	0	0	0	0	0	0
Bandera	0	0	0	0	0	0	0	0	0	0
Bastrop	0	0	0	0	0	0	0	0	0	0
Baylor	0	0	0	0	0	0	0	0	0	0
Bee	0	0	0	0	0	0	0	0	0	0
Bell	0	1	0	0	0	0	0	0	0	0
Bexar	0	0	0	0	0	0	0	0	0	0
Blanco	0	0	0	0	0	0	0	0	0	0
Borden	0	0	0	0	0	0	0	0	0	0
Bosque	0	0	0	0	0	0	0	0	0	0
Bowie	0	0	0	0	0	0	0	0	0	0
Brazoria	0	0	0	0	0	0	0	0	0	0
Brazos	0	0	0	0	0	0	0	0	0	0
Brewster	0	0	0	0	0	0	0	0	0	0
Briscoe	0	0	0	0	0	0	0	0	0	0
Brooks	0	0	0	0	0	0	0	0	0	0
Brown	0	0	0	0	0	0	0	0	0	0
Burleson	0	0	0	0	0	0	0	0	0	0
Burnet	0	0	0	0	0	4	0	0	0	0
Caldwell	0	0	0	0	0	0	0	0	0	0
Calhoun	0	0	0	0	0	0	0	0	0	0
Callahan	0	0	0	0	0	0	0	0	0	0
Cameron	0	0	0	0	0	0	0	0	0	0
Camp	0	0	0	0	0	0	0	0	0	0
Carson	0	0	0	0	0	0	0	0	0	0
Castro	0	0	0	0	0	0	0	0	0	0
Chambers	0	0	0	0	0	0	0	0	0	0
Cherokee	0	0	0	0	0	0	0	0	0	0
Childress	0	0	0	0	0	0	0	0	0	0
Clay	0	0	0	0	0	0	0	0	0	0
Coke	0	0	0	0	0	0	0	0	0	0
Coleman	0	0	0	0	0	0	0	0	0	0
Collin	0	0	0	0	0	0	0	0	0	0
Collingsworth	0	0	0	0	0	0	0	0	0	0
Colorado	0	0	0	0	0	0	0	0	0	0
Comal	0	0	0	0	1	0	0	0	0	0
Comanche	0	0	0	0	0	0	0	0	0	0
Concho	0	0	0	0	0	0	0	0	0	0
Cooke	0	0	0	0	0	0	0	0	0	0
Coryell	0	0	0	0	0	0	0	0	0	0
Cottle	0	0	0	0	0	0	0	0	0	0
Crane	0	0	0	0	0	0	0	0	0	0
Crockett	0	0	0	0	0	0	0	0	0	0
Crosby	0	0	0	0	0	0	0	0	0	0
Culberson	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Jollyville Plateau Salamander	Salado Springs Salamander	San Marcos Salamander	Comal Springs Riffle Beetle	Peck's Cave Amphipod	Bee Creek Cave Harvestman	Tooth Cave Spider	Tooth Cave Ground Beetle	Madla Cave Meshweaver	Government Canyon Bat Cave Spider
Take Exposure	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM	S/PUM	S/PUM	S/PUM	S/PUM
Take Likelihood	1	1	1	1	1	0.3	1	1	1	1
Adjacent Factor	1.83	1.83	1.83	1.83	1.83	1	1	1	1	1
Dallas	0	0	0	0	0	0	0	0	0	0
Dawson	0	0	0	0	0	0	0	0	0	0
De Witt	0	0	0	0	0	0	0	0	0	0
Deaf Smith	0	0	0	0	0	0	0	0	0	0
Delta	0	0	0	0	0	0	0	0	0	0
Denton	0	0	0	0	0	0	0	0	0	0
Dickens	0	0	0	0	0	0	0	0	0	0
Dimmit	0	0	0	0	0	0	0	0	0	0
Donley	0	0	0	0	0	0	0	0	0	0
Duval	0	0	0	0	0	0	0	0	0	0
Eastland	0	0	0	0	0	0	0	0	0	0
Ector	0	0	0	0	0	0	0	0	0	0
Edwards	0	0	0	0	0	0	0	0	0	0
Ellis	0	0	0	0	0	0	0	0	0	0
Erath	0	0	0	0	0	0	0	0	0	0
Falls	0	0	0	0	0	0	0	0	0	0
Fannin	0	0	0	0	0	0	0	0	0	0
Fayette	0	0	0	0	0	0	0	0	0	0
Fisher	0	0	0	0	0	0	0	0	0	0
Floyd	0	0	0	0	0	0	0	0	0	0
Foard	0	0	0	0	0	0	0	0	0	0
Fort Bend	0	0	0	0	0	0	0	0	0	0
Franklin	0	0	0	0	0	0	0	0	0	0
Freestone	0	0	0	0	0	0	0	0	0	0
Frio	0	0	0	0	0	0	0	0	0	0
Gaines	0	0	0	0	0	0	0	0	0	0
Galveston	0	0	0	0	0	0	0	0	0	0
Garza	0	0	0	0	0	0	0	0	0	0
Gillespie	0	0	0	0	0	0	0	0	0	0
Glasscock	0	0	0	0	0	0	0	0	0	0
Goliad	0	0	0	0	0	0	0	0	0	0
Gonzales	0	0	0	0	0	0	0	0	0	0
Gray	0	0	0	0	0	0	0	0	0	0
Grayson	0	0	0	0	0	0	0	0	0	0
Gregg	0	0	0	0	0	0	0	0	0	0
Grimes	0	0	0	0	0	0	0	0	0	0
Guadalupe	0	0	0	0	0	0	0	0	0	0
Hale	0	0	0	0	0	0	0	0	0	0
Hall	0	0	0	0	0	0	0	0	0	0
Hamilton	0	0	0	0	0	0	0	0	0	0
Hansford	0	0	0	0	0	0	0	0	0	0
Hardeman	0	0	0	0	0	0	0	0	0	0
Harris	0	0	0	0	0	0	0	0	0	0
Harrison	0	0	0	0	0	0	0	0	0	0
Hartley	0	0	0	0	0	0	0	0	0	0
Haskell	0	0	0	0	0	0	0	0	0	0
Hays	0	0	1	0	0	0	0	0	0	0
Hemphill	0	0	0	0	0	0	0	0	0	0
Henderson	0	0	0	0	0	0	0	0	0	0
Hidalgo	0	0	0	0	0	0	0	0	0	0
Hill	0	0	0	0	0	0	0	0	0	0
Hood	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

July 5, 2019

Plan Area County Name	Jollyville Plateau Salamander	Salado Springs Salamander	San Marcos Salamander	Comal Springs Riffle Beetle	Peck's Cave Amphipod	Bee Creek Cave Harvestman	Tooth Cave Spider	Tooth Cave Ground Beetle	Madla Cave Meshweaver	Government Canyon Bat Cave Spider
Take Exposure	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM	S/PUM	S/PUM	S/PUM	S/PUM
Take Likelihood	1	1	1	1	1	0.3	1	1	1	1
Adjacent Factor	1.83	1.83	1.83	1.83	1.83	1	1	1	1	1
Hopkins	0	0	0	0	0	0	0	0	0	0
Houston	0	0	0	0	0	0	0	0	0	0
Howard	0	0	0	0	0	0	0	0	0	0
Hudspeth	0	0	0	0	0	0	0	0	0	0
Hunt	0	0	0	0	0	0	0	0	0	0
Hutchinson	0	0	0	0	0	0	0	0	0	0
Irion	0	0	0	0	0	0	0	0	0	0
Jack	0	0	0	0	0	0	0	0	0	0
Jackson	0	0	0	0	0	0	0	0	0	0
Jasper	0	0	0	0	0	0	0	0	0	0
Jeff Davis	0	0	0	0	0	0	0	0	0	0
Jefferson	0	0	0	0	0	0	0	0	0	0
Jim Hogg	0	0	0	0	0	0	0	0	0	0
Jim Wells	0	0	0	0	0	0	0	0	0	0
Johnson	0	0	0	0	0	0	0	0	0	0
Jones	0	0	0	0	0	0	0	0	0	0
Karnes	0	0	0	0	0	0	0	0	0	0
Kaufman	0	0	0	0	0	0	0	0	0	0
Kendall	0	0	0	0	0	0	0	0	0	0
Kenedy	0	0	0	0	0	0	0	0	0	0
Kent	0	0	0	0	0	0	0	0	0	0
Kerr	0	0	0	0	0	0	0	0	0	0
Kimble	0	0	0	0	0	0	0	0	0	0
King	0	0	0	0	0	0	0	0	0	0
Kinney	0	0	0	0	0	0	0	0	0	0
Kleberg	0	0	0	0	0	0	0	0	0	0
Knox	0	0	0	0	0	0	0	0	0	0
La Salle	0	0	0	0	0	0	0	0	0	0
Lamar	0	0	0	0	0	0	0	0	0	0
Lamb	0	0	0	0	0	0	0	0	0	0
Lampasas	0	0	0	0	0	0	0	0	0	0
Lavaca	0	0	0	0	0	0	0	0	0	0
Lee	0	0	0	0	0	0	0	0	0	0
Leon	0	0	0	0	0	0	0	0	0	0
Liberty	0	0	0	0	0	0	0	0	0	0
Limestone	0	0	0	0	0	0	0	0	0	0
Lipscomb	0	0	0	0	0	0	0	0	0	0
Live Oak	0	0	0	0	0	0	0	0	0	0
Llano	0	0	0	0	0	0	0	0	0	0
Loving	0	0	0	0	0	0	0	0	0	0
Lubbock	0	0	0	0	0	0	0	0	0	0
Lynn	0	0	0	0	0	0	0	0	0	0
Madison	0	0	0	0	0	0	0	0	0	0
Martin	0	0	0	0	0	0	0	0	0	0
Mason	0	0	0	0	0	0	0	0	0	0
Matagorda	0	0	0	0	0	0	0	0	0	0
Maverick	0	0	0	0	0	0	0	0	0	0
Mcculloch	0	0	0	0	0	0	0	0	0	0
Mclennan	0	0	0	0	0	0	0	0	0	0
Mcmullen	0	0	0	0	0	0	0	0	0	0
Medina	0	0	0	0	0	0	0	0	5	5
Menard	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Jollyville Plateau Salamander	Salado Springs Salamander	San Marcos Salamander	Comal Springs Riffle Beetle	Peck's Cave Amphipod	Bee Creek Cave Harvestman	Tooth Cave Spider	Tooth Cave Ground Beetle	Madla Cave Meshweaver	Government Canyon Bat Cave Spider
Take Exposure	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM	S/PUM	S/PUM	S/PUM	S/PUM
Take Likelihood	1	1	1	1	1	0.3	1	1	1	1
Adjacent Factor	1.83	1.83	1.83	1.83	1.83	1	1	1	1	1
Midland	0	0	0	0	0	0	0	0	0	0
Milam	0	0	0	0	0	0	0	0	0	0
Mills	0	0	0	0	0	0	0	0	0	0
Mitchell	0	0	0	0	0	0	0	0	0	0
Montague	0	0	0	0	0	0	0	0	0	0
Montgomery	0	0	0	0	0	0	0	0	0	0
Moore	0	0	0	0	0	0	0	0	0	0
Morris	0	0	0	0	0	0	0	0	0	0
Motley	0	0	0	0	0	0	0	0	0	0
Nacogdoches	0	0	0	0	0	0	0	0	0	0
Navarro	0	0	0	0	0	0	0	0	0	0
Nolan	0	0	0	0	0	0	0	0	0	0
Nueces	0	0	0	0	0	0	0	0	0	0
Ochiltree	0	0	0	0	0	0	0	0	0	0
Oldham	0	0	0	0	0	0	0	0	0	0
Palo Pinto	0	0	0	0	0	0	0	0	0	0
Panola	0	0	0	0	0	0	0	0	0	0
Parker	0	0	0	0	0	0	0	0	0	0
Parmer	0	0	0	0	0	0	0	0	0	0
Pecos	0	0	0	0	0	0	0	0	0	0
Polk	0	0	0	0	0	0	0	0	0	0
Potter	0	0	0	0	0	0	0	0	0	0
Presidio	0	0	0	0	0	0	0	0	0	0
Rains	0	0	0	0	0	0	0	0	0	0
Randall	0	0	0	0	0	0	0	0	0	0
Reagan	0	0	0	0	0	0	0	0	0	0
Real	0	0	0	0	0	0	0	0	0	0
Red River	0	0	0	0	0	0	0	0	0	0
Reeves	0	0	0	0	0	0	0	0	0	0
Refugio	0	0	0	0	0	0	0	0	0	0
Roberts	0	0	0	0	0	0	0	0	0	0
Robertson	0	0	0	0	0	0	0	0	0	0
Rockwall	0	0	0	0	0	0	0	0	0	0
Runnels	0	0	0	0	0	0	0	0	0	0
Rusk	0	0	0	0	0	0	0	0	0	0
San Augustine	0	0	0	0	0	0	0	0	0	0
San Jacinto	0	0	0	0	0	0	0	0	0	0
San Patricio	0	0	0	0	0	0	0	0	0	0
San Saba	0	0	0	0	0	0	0	0	0	0
Schleicher	0	0	0	0	0	0	0	0	0	0
Scurry	0	0	0	0	0	0	0	0	0	0
Shackelford	0	0	0	0	0	0	0	0	0	0
Shelby	0	0	0	0	0	0	0	0	0	0
Smith	0	0	0	0	0	0	0	0	0	0
Somervell	0	0	0	0	0	0	0	0	0	0
Starr	0	0	0	0	0	0	0	0	0	0
Stephens	0	0	0	0	0	0	0	0	0	0
Sterling	0	0	0	0	0	0	0	0	0	0
Stonewall	0	0	0	0	0	0	0	0	0	0
Sutton	0	0	0	0	0	0	0	0	0	0
Swisher	0	0	0	0	0	0	0	0	0	0
Tarrant	0	0	0	0	0	0	0	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Jollyville Plateau Salamander	Salado Springs Salamander	San Marcos Salamander	Comal Springs Riffle Beetle	Peck's Cave Amphipod	Bee Creek Cave Harvestman	Tooth Cave Spider	Tooth Cave Ground Beetle	Madla Cave Meshweaver	Government Canyon Bat Cave Spider
Take Exposure	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM + S/PM + S/PUM-Adj 50 ft + S/PM-Adj 50 ft	S/PUM	S/PUM	S/PUM	S/PUM	S/PUM
Take Likelihood	1	1	1	1	1	0.3	1	1	1	1
Adjacent Factor	1.83	1.83	1.83	1.83	1.83	1	1	1	1	1
Taylor	0	0	0	0	0	0	0	0	0	0
Terrell	0	0	0	0	0	0	0	0	0	0
Terry	0	0	0	0	0	0	0	0	0	0
Throckmorton	0	0	0	0	0	0	0	0	0	0
Titus	0	0	0	0	0	0	0	0	0	0
Tom Green	0	0	0	0	0	0	0	0	0	0
Travis	13	0	1	0	0	16	3	4	0	0
Trinity	0	0	0	0	0	0	0	0	0	0
Tyler	0	0	0	0	0	0	0	0	0	0
Upshur	0	0	0	0	0	0	0	0	0	0
Upton	0	0	0	0	0	0	0	0	0	0
Uvalde	0	0	0	0	0	0	0	0	0	0
Val Verde	0	0	0	0	0	0	0	0	0	0
Van Zandt	0	0	0	0	0	0	0	0	0	0
Victoria	0	0	0	0	0	0	0	0	0	0
Walker	0	0	0	0	0	0	0	0	0	0
Waller	0	0	0	0	0	0	0	0	0	0
Ward	0	0	0	0	0	0	0	0	0	0
Washington	0	0	0	0	0	0	0	0	0	0
Webb	0	0	0	0	0	0	0	0	0	0
Wharton	0	0	0	0	0	0	0	0	0	0
Wheeler	0	0	0	0	0	0	0	0	0	0
Wichita	0	0	0	0	0	0	0	0	0	0
Wilbarger	0	0	0	0	0	0	0	0	0	0
Willacy	0	0	0	0	0	0	0	0	0	0
Williamson	2	0	0	0	0	0	2	3	0	0
Wilson	0	0	0	0	0	0	0	0	0	0
Winkler	0	0	0	0	0	0	0	0	0	0
Wise	0	0	0	0	0	0	0	0	0	0
Wood	0	0	0	0	0	0	0	0	0	0
Young	0	0	0	0	0	0	0	0	0	0
Zapata	0	0	0	0	0	0	0	0	0	0
Zavala	0	0	0	0	0	0	0	0	0	0
TOTAL Plan Area	**15**	**1**	**2**	**0**	**1**	**20**	**5**	**7**	**5**	**5**
Direct + Indirect Take	**16**	**1**	**2**	**0**	**1**	**88**	**10**	**14**	**10**	**10**

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
Take Exposure	S/PUM	S/PUM	S/PUM
Take Likelihood	1	1	1
Adjacent Factor	1	1	1
Anderson	0	0	0
Andrews	0	0	0
Angelina	0	0	0
Aransas	0	0	0
Archer	0	0	0
Armstrong	0	0	0
Atascosa	0	0	0
Austin	0	0	0
Bandera	0	0	0
Bastrop	0	0	0
Baylor	0	0	0
Bee	0	0	0
Bell	0	0	0
Bexar	0	0	0
Blanco	0	0	0
Borden	0	0	0
Bosque	0	0	0
Bowie	0	0	0
Brazoria	0	0	0
Brazos	0	0	0
Brewster	0	0	0
Briscoe	0	0	0
Brooks	0	0	0
Brown	0	0	0
Burleson	0	0	0
Burnet	0	0	0
Caldwell	0	0	0
Calhoun	0	0	0
Callahan	0	0	0
Cameron	0	0	0
Camp	0	0	0
Carson	0	0	0
Castro	0	0	0
Chambers	0	0	0
Cherokee	0	0	0
Childress	0	0	0
Clay	0	0	0
Coke	0	0	0
Coleman	0	0	0
Collin	0	0	0
Collingsworth	0	0	0
Colorado	0	0	0
Comal	0	0	0
Comanche	0	0	0
Concho	0	0	0
Cooke	0	0	0
Coryell	0	0	0
Cottle	0	0	0
Crane	0	0	0
Crockett	0	0	0
Crosby	0	0	0
Culberson	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
Take Exposure	S/PUM	S/PUM	S/PUM
Take Likelihood	1	1	1
Adjacent Factor	1	1	1
Dallas	0	0	0
Dawson	0	0	0
De Witt	0	0	0
Deaf Smith	0	0	0
Delta	0	0	0
Denton	0	0	0
Dickens	0	0	0
Dimmit	0	0	0
Donley	0	0	0
Duval	0	0	0
Eastland	0	0	0
Ector	0	0	0
Edwards	0	0	0
Ellis	0	0	0
Erath	0	0	0
Falls	0	0	0
Fannin	0	0	0
Fayette	0	0	0
Fisher	0	0	0
Floyd	0	0	0
Foard	0	0	0
Fort Bend	0	0	0
Franklin	0	0	0
Freestone	0	0	0
Frio	0	0	0
Gaines	0	0	0
Galveston	0	0	0
Garza	0	0	0
Gillespie	0	0	0
Glasscock	0	0	0
Goliad	0	0	0
Gonzales	0	0	0
Gray	0	0	0
Grayson	0	0	0
Gregg	0	0	0
Grimes	0	0	0
Guadalupe	0	0	0
Hale	0	0	0
Hall	0	0	0
Hamilton	0	0	0
Hansford	0	0	0
Hardeman	0	0	0
Harris	0	0	0
Harrison	0	0	0
Hartley	0	0	0
Haskell	0	0	0
Hays	0	0	0
Hemphill	0	0	0
Henderson	0	0	0
Hidalgo	0	0	0
Hill	0	0	0
Hood	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
Take Exposure	S/PUM	S/PUM	S/PUM
Take Likelihood	1	1	1
Adjacent Factor	1	1	1
Hopkins	0	0	0
Houston	0	0	0
Howard	0	0	0
Hudspeth	0	0	0
Hunt	0	0	0
Hutchinson	0	0	0
Irion	0	0	0
Jack	0	0	0
Jackson	0	0	0
Jasper	0	0	0
Jeff Davis	0	0	0
Jefferson	0	0	0
Jim Hogg	0	0	0
Jim Wells	0	0	0
Johnson	0	0	0
Jones	0	0	0
Karnes	0	0	0
Kaufman	0	0	0
Kendall	0	0	0
Kenedy	0	0	0
Kent	0	0	0
Kerr	0	0	0
Kimble	0	0	0
King	0	0	0
Kinney	0	0	0
Kleberg	0	0	0
Knox	0	0	0
La Salle	0	0	0
Lamar	0	0	0
Lamb	0	0	0
Lampasas	0	0	0
Lavaca	0	0	0
Lee	0	0	0
Leon	0	0	0
Liberty	0	0	0
Limestone	0	0	0
Lipscomb	0	0	0
Live Oak	0	0	0
Llano	0	0	0
Loving	0	0	0
Lubbock	0	0	0
Lynn	0	0	0
Madison	0	0	0
Martin	0	0	0
Mason	0	0	0
Matagorda	0	0	0
Maverick	0	0	0
Mcculloch	0	0	0
Mclennan	0	0	0
Mcmullen	0	0	0
Medina	5	5	5
Menard	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
Take Exposure	S/PUM	S/PUM	S/PUM
Take Likelihood	1	1	1
Adjacent Factor	1	1	1
Midland	0	0	0
Milam	0	0	0
Mills	0	0	0
Mitchell	0	0	0
Montague	0	0	0
Montgomery	0	0	0
Moore	0	0	0
Morris	0	0	0
Motley	0	0	0
Nacogdoches	0	0	0
Navarro	0	0	0
Nolan	0	0	0
Nueces	0	0	0
Ochiltree	0	0	0
Oldham	0	0	0
Palo Pinto	0	0	0
Panola	0	0	0
Parker	0	0	0
Parmer	0	0	0
Pecos	0	0	0
Polk	0	0	0
Potter	0	0	0
Presidio	0	0	0
Rains	0	0	0
Randall	0	0	0
Reagan	0	0	0
Real	0	0	0
Red River	0	0	0
Reeves	0	0	0
Refugio	0	0	0
Roberts	0	0	0
Robertson	0	0	0
Rockwall	0	0	0
Runnels	0	0	0
Rusk	0	0	0
San Augustine	0	0	0
San Jacinto	0	0	0
San Patricio	0	0	0
San Saba	0	0	0
Schleicher	0	0	0
Scurry	0	0	0
Shackelford	0	0	0
Shelby	0	0	0
Smith	0	0	0
Somervell	0	0	0
Starr	0	0	0
Stephens	0	0	0
Sterling	0	0	0
Stonewall	0	0	0
Sutton	0	0	0
Swisher	0	0	0
Tarrant	0	0	0

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

Appendix F -- Estimated Indirect Habitat Modification from Covered Activities

Plan Area County Name	Helotes Mold Beetle	Elongate Ground Beetle with no common name (*Rhadine exilis*)	Robust Ground Beetle with no common name (*Rhadine infernalis*)
Take Exposure	S/PUM	S/PUM	S/PUM
Take Likelihood	1	1	1
Adjacent Factor	1	1	1
Taylor	0	0	0
Terrell	0	0	0
Terry	0	0	0
Throckmorton	0	0	0
Titus	0	0	0
Tom Green	0	0	0
Travis	0	0	0
Trinity	0	0	0
Tyler	0	0	0
Upshur	0	0	0
Upton	0	0	0
Uvalde	0	0	0
Val Verde	0	0	0
Van Zandt	0	0	0
Victoria	0	0	0
Walker	0	0	0
Waller	0	0	0
Ward	0	0	0
Washington	0	0	0
Webb	0	0	0
Wharton	0	0	0
Wheeler	0	0	0
Wichita	0	0	0
Wilbarger	0	0	0
Willacy	0	0	0
Williamson	0	0	0
Wilson	0	0	0
Winkler	0	0	0
Wise	0	0	0
Wood	0	0	0
Young	0	0	0
Zapata	0	0	0
Zavala	0	0	0
TOTAL Plan Area	**5**	**5**	**5**
Direct + Indirect Take	**10**	**10**	**10**

Conceptual Calculation:
*(ITP Term Disturbances +(Average Annual Disturbances*30)) * % of County as Habitat * Adjacent Factor (if applicable) * Take Likelihood Factor; rounded to the nearest whole acre*

APPENDIX G

Analysis of Jeopardy and Destruction or Adverse Modification of Critical Habitat for Federally Listed Species

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TECHNICAL MEMORANDUM

To: Erik Huebner, Environmental Affairs, Lower Colorado River Authority (LCRA), on behalf of LCRA Transmission Services Corporation (LCRA TSC)

CC: Lyn Clancy, LCRA Managing Associate General Counsel, on behalf of LCRA TSC
Alan Glen, Nossaman LLP

From: Amanda Aurora, SWCA Environmental Consultants

Date: July 5, 2019

Re: LCRA TSC Transmission System Habitat Conservation Plan – Analysis of Jeopardy and Destruction or Adverse Modification of Critical Habitat

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LCRA Transmission Services Corporation (LCRA TSC) has prepared a draft Habitat Conservation Plan (HCP) that supports an application for an incidental take permit (ITP) under the Endangered Species Act (ESA) that will be submitted to the U.S. Fish and Wildlife Service (USFWS).[1] The Plan Area for this HCP includes 241 of the 254 counties in Texas (see Figure 1 of the HCP). The HCP addresses LCRA TSC activities that involve the construction, operation, upgrade, decommissioning, repair and maintenance of electrical transmission lines, substations, access roads, and related infrastructure and facilities within the Plan Area (the LCRA TSC Activities). However, only those specific instances of one or more LCRA TSC Activities performed within a specific geographic area during a specific time and for which LCRA TSC desires to use the HCP and ITP to authorize incidental take of certain Covered Species become the Covered Activities that would be subject to the provisions of the HCP and ITP.

USFWS identifies 107 federally threatened or endangered species occur or may occur within the Plan Area (see Table 1; there are no species proposed for listing at the time of this writing). Designated critical habitats (as defined in Section 3(5)(A) of the ESA) associated with 38 federally listed species and proposed critical habitats associated with 2 federally listed species also occur within the Plan Area (see Table 1).

Section 7(a)(2) of the ESA (Section 7) requires that federal agencies (hereafter, the "action agencies") ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species in the wild or result in the destruction or adverse modification of critical habitat (16 USC §1536(a)(2)), and the ESA and its implementing regulations further require that where a federal action may affect listed species or critical habitat, the action agencies consult with USFWS to meet their obligation under Section 7. USFWS considers its issuance of an ITP a federal action to which the

[1] Capitalized or other defined terms used in this technical memorandum are defined in the Glossary to the LCRA TSC HCP.

consultation requirement of ESA Section 7 applies (USFWS and NMFS 2016). With respect to the issuance of ITPs, the USFWS functions as both the "action" agency and the "resource" agency, such that the USFWS consults with itself concerning the effects of its issuance of the ITP. According to the HCP Handbook, the consultation must include, among other things, an assessment of the impacts and likelihood of jeopardy and any adverse modification of Critical Habitat for all listed species (USFWS and NMFS 2016).

To assist the USFWS with its Section 7 consultation, this technical memorandum reviews whether the proposed issuance of the ITP is likely to jeopardize the continued existence of any listed species (excluding Covered Species); Covered Species (whether listed or not); or species proposed for listing. This technical memorandum also reviews whether the proposed issuance of the ITP is likely to result in the destruction or adverse modification of any designated or proposed critical habitat. The USFWS and NMFS encourage ITP applicants to provide such information in an HCP (USFWS and NMFS 2016:7–5 and 7–17).

JEOPARDY ANALYSIS

Regulations implementing the ESA define the term "jeopardize the continued existence of" as meaning "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR §402.02). Therefore, as applied to the USFWS' proposed issuance of an ITP, the jeopardy analysis essentially examines two, sequential tests:

1. The potential for Covered Activities to reduce the reproduction, numbers, or distribution of a listed species (Jeopardy Test 1), and, if so;
2. The potential for any such reductions in the reproduction, numbers, or distribution of a listed species to appreciably reduce the likelihood of both survival and recovery of that species in the wild (Jeopardy Test 2).

As described below and in Table 1 to this technical memorandum, the issuance of the ITP would not jeopardize the continued existence of any listed species; Covered Species (whether listed or not); or species proposed for listing.

WILDLIFE SPECIES

The HCP uses a Habitat Surrogate to estimate and track incidental take using the acres of habitat that is directly or indirectly modified by a Covered Activity as a surrogate for the number of individuals actually taken. Incidental take associated with the Covered Activities, by way of killing, wounding, or harming individuals of listed wildlife species, has the potential to reduce the reproduction, numbers, or distribution of such species. Therefore, Jeopardy Test 1 for listed wildlife species may be reasonably approximated by a determination of whether incidental take is likely to occur because of the Covered Activities. LCRA TSC included as Covered Species in the HCP those listed wildlife species (and one additional unlisted wildlife species that has been petitioned for listing) for which the Covered Activities

are likely to cause incidental take.[2] LCRA TSC excluded certain listed karst invertebrate species that are included as covered species in other habitat conservation plans through which LCRA TSC may obtain coverage. The Covered Species meet Jeopardy Test 1 and warrant a review under Jeopardy Test 2.

LCRA TSC did not include as Covered Species those listed wildlife species that are unlikely to be incidentally taken by the Covered Activities or that are included as covered species in other habitat conservation plans through which LCRA TSC may obtain coverage. Listed wildlife species that are not likely to be incidentally taken by the Covered Activities do not meet Jeopardy Test 1, since individuals of these species are not likely to be killed, wounded, or harmed and, therefore, the species is not likely to experience a reduction in reproduction, numbers, or distribution. See Appendix B of the HCP for additional discussion about the selection of the Covered Species for the HCP. The HCP also includes commitments by LCRA TSC to implement General Minimization Measures applicable to all Covered Activities that provide assurances that the Covered Activities are not likely to incidentally take listed wildlife species that are not Covered Species (or any such take would be addressed through other ESA compliance options, such as another HCP).

For Covered Species, the HCP provides information to evaluate Jeopardy Test 2. The HCP includes an assessment of the impacts of the maximum amount of incidental take requested by LCRA TSC (see Chapter 5.3), identifies the maximum amount of Mitigation that LCRA TSC would implement to address incidental take (see Chapter 6.1.2), describes voluntary Avoidance Measures (see Chapter 6.2 and Appendix D), describes General and Species-specific Minimization Measures (see Chapter 6.4 and Appendix D), and provides guidance for implementing Mitigation (see Chapter 6.5 and Appendix D). The conservation benefits of these measures further decrease the potential for any appreciable reduction in the likelihood of both survival and recovery of any Covered Species in the wild.

Notably, the maximum amount of incidental take requested by LCRA TSC in the HCP, measured in terms of a Habitat Surrogate, does not exceed 3% of the total estimated amount of potential habitat for any Covered Species, either within the Plan Area or across the entire range of the species. In most cases, the requested amount of take does not exceed 1% of the total estimated amount of potential habitat for a Covered Species. Therefore, the amount of take that would be authorized by the ITP is in each case a very small proportion of the total amount of potential habitat for each Covered Species in the Plan Area or across its range, indicating that the potential for authorized incidental take to appreciably reduce the likelihood of both survival and recovery of that species in the wild is unlikely—even in the absence of any conservation measures.

For federally listed wildlife species and the unlisted Covered Species that may occur in the Plan Area, each is either:

1) not likely to experience a reduction in its reproduction, numbers, or distribution (i.e., incidental take is not likely) or

[2] LCRA TSC excluded from the Covered Species of the HCP certain listed karst invertebrate species that are included as covered species in other habitat conservation plans through which LCRA TSC may obtain coverage.

2) the reduction of its reproduction, numbers, or distribution (as measured by the Habitat Surrogate) affects such a small proportion of the total amount of available potential habitat and the adverse impacts of incidental take are further reduced by the conservation benefits of the HCP's Conservation Program,

that the issuance of the ITP would not reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of any such federally listed wildlife species in the wild.

Table 1 provides a brief review of the Jeopardy Tests for each federally listed wildlife species or unlisted Covered Species that may occur in the Plan Area.

Plant Species

LCRA TSC did not include federally listed plants as Covered Species because: (1) LCRA TSC does not anticipate that the LCRA TSC Activities would violate the ESA with respect to listed plants on non-federal lands; (2) in the unlikely event that LCRA TSC Activities would occur on federal lands, effects to listed plants would be addressed pursuant to Section 7 in those specific instances; and (3) USFWS guidance states that because "[i]mpacts to plants do not fall under the definition of 'take'…[USFWS] cannot authorize incidental take of plants" (USFWS and NMFS 2016:7−2). Therefore, additional analysis is needed to address Jeopardy Test 1 for listed plants.

For most of the federally listed plant species that may occur in the Plan Area, destruction of individual plants is likely avoided due to the limited potential for exposure of the plant species to LCRA TSC Activities based on known range, distribution, or habitat of the species in relation to the likely locations of Covered Activities (see Appendix B and Chapter 4.3.2 of the HCP). Furthermore, occurrences of federally listed plants that do not overlap with the habitats of one or more Covered Species are not likely to be exposed to Covered Activities (i.e., a LCRA TSC Activity that is not likely to incidentally take a Covered Species would not become a Covered Activity in the HCP).

Table 1 identifies the federally listed plant species that may overlap with habitats for one or more Covered Species and that could, in certain circumstances, be exposed to Covered Activities and meet Jeopardy Test 1. This analysis relies on the general species information in Appendix B of the HCP, additional range information for listed species from the USFWS's Environmental Conservation Online System database (https://ecos.fws.gov/ecp; accessed between August 3 and August 5, 2018), and additional information about the Covered Species summarized in Appendix D of the HCP and SWCA (2018).

For the federally listed plant species that might be exposed to Covered Activities, the likelihood that any potential destruction of individuals would appreciably reduce the likelihood of both survival and recovery of that species in the wild (Jeopardy Test 2) is first substantially reduced by the limited footprint of subsurface disturbances associated with the Covered Activities. Table 7 of the HCP describes the typical extents of subsurface disturbances associated with LCRA TSC Facilities. These subsurface disturbances include modifications to the soil surface and soil profile by actions such as surface grading or excavation that could destroy individuals of a federally listed plant species, if present. LCRA TSC estimates the extent of subsurface disturbances over previously unmodified lands

associated with its LCRA TSC Activities (only a portion of which will become Covered Activities), as affecting approximately 5,252 acres across the entire Plan Area (which covers nearly 163 million acres) over 30 years. This extent of subsurface disturbance is less than 0.005% of the acreage of the Plan Area or 1 acre of new subsurface disturbance for every 31,036 acres of the Plan Area. Furthermore, the linear nature and/or relatively small footprint of the LCRA TSC Activities (i.e., ROWs that are typically 120 feet wide and site-based Facilities that are typically 10 acres) means that these disturbances will be widely distributed across the landscape and not concentrated in any one area such that a particular population of a listed or proposed for listing plant species is likely to be substantially at risk of destruction.

Some individuals of listed or proposed for listing plant species could also be destroyed by surface disturbances associated with the LCRA TSC Activities, for example by being cut or trimmed during vegetation clearing or crushed by vehicles operating in ROWs. However, many plants can withstand occasional alteration of their physical forms as an adaptation to herbivory or periods of inhospitable weather like seasonal drought or freezing temperature. Therefore, it is reasonable to assume that most surface disturbances would present less of a risk to listed or proposed for listing plant species than subsurface disturbances, and that the LCRA TSC Activities overall present a relatively low risk for destroying a substantial number of individuals of a listed or proposed for listing plant species.

This already low risk is further decreased for those listed and proposed for listing plant species that are relatively common or numerous. The loss of a small proportion of the population of a relatively abundant plant species (i.e., populations with individuals numbering in the thousands to even millions) would not be expected to jeopardize the continued existence of that plant species. Similarly, the loss of one population of plants might have little or no effect on the fate of other populations in different locations.

For those listed plant species that may be exposed to Covered Activities (i.e., those that meet Jeopardy Test 1), the already unlikely destruction of a substantial number of individual plants during the conduct of Covered Activities is minimized by the application of General Minimization Measures (see HCP Chapter 6.4.1). These General Minimization Measures include a commitment by LCRA TSC when planning for and implementing Covered Activities—to the extent practicable—to avoid subsurface disturbances at previously documented localities of a listed or proposed for listing plant species and to minimize the impact of surface disturbances by implementing raised cutting or mowing heights in areas known to be occupied by such plant species. In circumstances where this is not practicable to implement such measures, then LCRA TSC will coordinate with USFWS in advance of the Covered Activity to identify and implement other practicable conservation measures that may be necessary to avoid jeopardizing the continued existence of the listed or proposed for listing plant species. LCRA TSC will consider the best available information on the reported distributions of listed or proposed for listing plant (i.e., the current baseline status of the species) in implementing these General Minimization Measures, such as may be available from the Texas Natural Diversity Database or USFWS reports. However, LCRA TSC does not expect to perform surveys for plant species when planning for Covered Activities.

Through a combination of lack of exposure to Covered Activities, the inherently low likelihood of significantly adverse population-level effects from the Covered Activities (e.g., widely distributed disturbances, small subsurface disturbance footprints), and the application of General Minimization

Measures, LCRA TSC does not believe that the Covered Activities will reduce the baseline status of any listed or proposed for listing plant species to the point where LCRA TSC would appreciably reduce the likelihood of both survival and recovery of that plant species in the wild. Therefore, the HCP reasonably avoids the potential for jeopardizing the continued existence of listed plant species.

CRITICAL HABITAT ANALYSIS

USFWS regulations define "destruction or adverse modification of critical habitat" to mean "a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (50 CFR §402.02). The USFWS explains that this it is likely to conclude that destruction or adverse modification of critical habitat has occurred if "the action results in an alteration of the quantity or quality of the essential physical or biological features of designated critical habitat, or that precludes or significantly delays the capacity of that habitat to develop those features over time, and if the effect of the alteration is to appreciably diminish the value of critical habitat for the conservation of the species" (81 Federal Register 7216). Like the jeopardy analysis, the critical habitat analysis essentially involves the evaluation of two, sequential tests:

1. The potential for Covered Activities to directly or indirectly alter (or delay or preclude development of) the physical or biological features essential to the conservation of the listed species (Critical Habitat Test 1), and, if so;
2. The potential for any such alterations to appreciably diminish the value of critical habitat for the conservation of the listed species (Critical Habitat Test 2).

In general, Critical Habitat Test 1 can be assessed by determining if existing LCRA TSC Facilities occur within a unit of critical habitat and whether Covered Activities are likely to cross areas of critical habitat. It is not likely that the Covered Activities will directly or indirectly alter Critical Habitat under one or more of the following circumstances:

1. Critical habitat units do not currently contain LCRA TSC Facilities (note: LCRA TSC attempts to avoid placing Structures within critical habitat, when possible);
2. Critical habitat units are in areas that are not likely to receive much New Construction (see those parts of the Plan Area that are within the Outside ERCOT Activity Zone or Other Counties Activity Zone, described in Chapter 4.3.2 of the HCP);
3. Critical habitat units do not overlap with the habitat of a Covered Species (i.e., LCRA TSC Activities that do not impact the habitat of a Covered Species are unlikely to become Covered Activities); or
4. The configuration of the critical habitat units makes such areas readily avoidable (i.e., are small or narrow, such that the critical habitat unit may be spanned or otherwise avoided by micrositing).

Where Covered Activities may occur within and alter critical habitat, the HCP Conservation Program provides information to help assess Critical Habitat Test 2. The likelihood that the Covered Activities would appreciably diminish the value of critical habitat for the conservation of the associated listed species is reduced by those aspects of the HCP Conservation Program that promote the avoidance or

minimization of impacts to critical habitat (i.e., these measures strongly encourage LCRA TSC to limit the extent of disturbances within critical habitat, even if critical habitat cannot be completely avoided).

The HCP Conservation Program includes General Minimization Measures that are applicable to all Covered Activities that call for avoiding disturbances to the most essential components of critical habitat for Covered Species that are karst invertebrates, *Eurycea* salamanders, or aquatic invertebrates. LCRA TSC will avoid creating disturbances within 50 feet of Occupied or Assumed Occupied Karst Features and Spring Features, whether part of critical habitat or not, which substantially avoids or minimizes potentially adverse effects to those habitat features that are most strongly associated with species presence and that are most essential to their conservation. Similarly, other General Minimization Measures substantially avoid or minimize potentially adverse effects on wetland, riparian, and aquatic habitats—thereby benefiting critical habitats that incorporate such features, such as critical habitats for listed fish.

The species-specific portion of the HCP Conservation Program (see Appendix D of the HCP) also contains conservation measures that avoid or diminish the significance of potential alterations to critical habitat for other Covered Species. The HCP prescribes substantially greater Mitigation Ratios for disturbances within critical habitat for all of the applicable Covered Species except for the Houston toad (see HCP Chapter 6.6.8 and Appendix D). For the Houston toad, which has broadly defined critical habitat, the Special Cases Enrollment Scenario encourages the avoidance of important breeding habitat features (see HCP Appendix D) that substantially reduces the likelihood of Covered Activities appreciably reducing the value of critical habitat for this species.

For each species with designated or proposed Critical Habitat, Table 1 describes how the Covered Activities would not destroy or adversely modify Critical Habitat or proposed Critical Habitat for any listed species.

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Table 1. Jeopardy and Adverse Modification of Critical Habitat Tests

July 5, 2019

Ref. No.	Scientific Name	Common Name	Taxon	Federal Status	Jeopardy Analysis Test 1	Jeopardy Analysis Test 2	Likely to Jeopardize the Continued Existence of the Species?	Jeopardy Analysis Notes	Critical Habitat	Critical Habitat Analysis Test 1	Critical Habitat Analysis Test 2	Likely to Destroy or Adversely Modify Critical Habitat?	Critical Habitat Analysis Notes
1.	*Eurycea waterlooensis*	Austin blind salamander	Amphibians	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely as impacts to deep aquifer habitat is not expected and the application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Travis County with 1 Critical Habitat Unit containing 120 acres, including surface and subsurface components.	Yes	No	No	No existing LCRA TSC Facilities occur in Critical Habitat for this species, but existing Facilities are approximately 2 miles from Critical Habitat. Not a Covered Species due to the very low likelihood of modifying the deep aquifer habitat used by this species (see HCP Appendix B). Impacts to surface Critical Habitat are minimized by HCP General Minimization Measures related to waterway protection and avoidance of Occupied or Assumed Occupied Spring Features (see HCP Chapter 6.4.1).
2.	*Eurycea sosorum*	Barton Springs salamander	Amphibians	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 1% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Spring Features, and Mitigation of up to 2 Conservation Credits (see HCP Chapter 6 and Appendix D).	No	N/A	N/A	N/A	
3.	*Notophthalmus meridionalis*	Black-spotted newt	Amphibians	Petitioned for Listing: Findings Not Yet Made	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
4.	*Eurycea robusta*	Blanco blind salamander	Amphibians	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
5.	*Eurycea latitans*	Cascade Caverns salamander	Amphibians	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
6.	*Eurycea tridentifera*	Comal blind salamander	Amphibians	Petitioned for Listing: Findings Not Yet Made	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
7.	*Eurycea sp. 8*	Comal Springs salamander	Amphibians	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
8.	*Eurycea naufragia*	Georgetown salamander	Amphibians	T	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.5% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Spring Features, and Mitigation of up to 1 Conservation Credit (see HCP Chapter 6 and Appendix D).	Proposed in Williamson County as 14 units of Critical Habitat containing 1,031 acres with surface and subsurface components.	Yes	No	No	No LCRA TSC Facilities currently occur in Proposed Critical Habitat. Special Rule for this species strongly incentivizes avoidance of proposed Critical Habitat. HCP includes General Minimization Measures (including waterway protection and avoidance of Occupied or Assumed Occupied Spring Features) and Species-specific Minimization Measures and a Special Cases Enrollment Scenario for assessing greater amounts of Mitigation that further minimize any alterations to Proposed Critical Habitat (see HCP Chapter 6 and Appendix D). Proposed Critical Habitat is

													dispersed across 14 separate units, which isolate potential alterations to only the affected unit(s).
9.	*Anaxyrus (syn. Bufo) houstonensis*	Houston toad	Amphibians	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.1% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures, and Mitigation of up to 617 Conservation Credits (see HCP Chapter 6 and Appendix D).	Designated in Bastrop and Burleson Counties as 84,475 acres in 2 units.	Yes	No	No	Existing LCRA TSC Facilities occur in Critical Habitat for this species. HCP includes General and Species-specific Minimization Measures and a Special Cases Enrollment Scenario for assessing greater amounts of Mitigation for impacts around breeding ponds that minimize the magnitude of alterations to Critical Habitat (see HCP Chapter 6 and Appendix D).
10.	*Eurycea tonkawae*	Jollyville Plateau salamander	Amphibians	T	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.5% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Spring Features, and Mitigation of up to 11 Conservation Credits (see HCP Chapter 6 and Appendix D).	Designated in Travis and Williamson Counties as 4,331 acres in 32 units with surface and subsurface components.	Yes	No	No	Existing LCRA TSC Facilities occur in Critical Habitat for this species. HCP includes General Minimization Measures (including waterway protection and avoidance of Occupied or Assumed Occupied Spring Features) and Species-specific Minimization Measures and a Special Cases Enrollment Scenario for assessing greater amounts of Mitigation for impacts within Critical Habitat that minimize the magnitude of alterations to Critical Habitat (see HCP Chapter 6 and Appendix D). Critical Habitat is dispersed across 32 separate units, which isolate potential alterations to only the affected unit(s).
11.	*Rhinophrynus dorsalis*	Mexican burrowing toad	Amphibians	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
12.	*Smilisca baudinii*	Mexican treefrog	Amphibians	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
13.	*Eurycea chisholmensis*	Salado Springs salamander	Amphibians	T	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.5% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures, and Mitigation of up to 1 Conservation Credit (see HCP Chapter 6 and Appendix D).	Proposed in Bell County as 372 acres in 4 units with surface and subsurface components.	Yes	No	No	No LCRA TSC Facilities currently occur in proposed Critical Habitat. HCP includes General Minimization Measures (including waterway protection and avoidance of Occupied or Assumed Occupied Spring Features) and Species-specific Minimization Measures and a Special Cases Enrollment Scenario for assessing greater amounts of Mitigation for impacts within proposed Critical Habitat that minimize any alterations to proposed Critical Habitat (see HCP Chapter 6 and Appendix D). Proposed Critical Habitat is dispersed across 4 separate units, which isolate potential alterations to only the affected unit(s).
14.	*Eurycea nana*	San Marcos salamander	Amphibians	T	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 1% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Spring Features, and Mitigation of up to 1 Conservation Credit (see HCP Chapter 6 and Appendix D).	Designated in Hays County as 20.9 acres in 1 unit.	Yes	No	No	Existing LCRA TSC Facilities cross this Critical Habitat. Configuration of Critical Habitat is long and narrow, which provides opportunity for spanning to avoid significant alterations. HCP includes General Minimization Measures (including waterway protection and avoidance of Occupied or Assumed Occupied Spring Features) and Species-specific Minimization Measures and a Special Cases Enrollment

													Scenario for assessing greater amounts of Mitigation for impacts within Critical Habitat that minimize any alterations to Critical Habitat (see HCP Chapter 6 and Appendix D).
15.	*Hypopachus variolosus*	Sheep frog	Amphibians	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
16.	*Siren sp 1*	South Texas siren (large form)	Amphibians	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
17.	*Typhlomolge (syn. Eurycea) rathbuni*	Texas blind salamander	Amphibians	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely as impacts to deep aquifer habitat is not expected and the application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
18.	*Eurycea neotenes*	Texas salamander	Amphibians	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
19.	*Leptodactylus fragilis*	White-lipped frog	Amphibians	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
20.	*Texella reddelli*	Bee Creek Cave harvestman	Arachnids	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.1% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features, and Mitigation of up to 17 Conservation Credits (see HCP Chapter 6 and Appendix D).	No	N/A	N/A	N/A	
21.	*Texella reyesi*	Bone Cave harvestman	Arachnids	E; petitioned for delisting	No	No	No	Not an HCP Covered Species. HCP includes a commitment to rely on other mechanisms for ESA compliance (e.g., Section 7 interagency consultation or other existing HCPs), as necessary and appropriate.	No	N/A	N/A	N/A	
22.	*Cicurina venii*	Braken Bat Cave meshweaver	Arachnids	E	No	No	No	Not an HCP Covered Species. Recent research indicates this may not be a valid taxon (see HCP Appendix B).	Designated in Bexar County as 217 acres in 1 unit.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and Critical Habitat occurs within the plan area of the Southern Edwards Plateau HCP. At this time, LCRA TSC does not expect to perform LCRA TSC Activities involving New Construction in Bexar County. Therefore, Covered Activities are not expected within this unit of Critical Habitat (see HCP Chapter 6.3.2).
23.	*Texella cokendolpheri*	Cokendolpher Cave harvestman	Arachnids	E	No	No	No	Not an HCP Covered Species. HCP includes a commitment to rely on other mechanisms for ESA compliance (e.g., Section 7 interagency consultation or other existing HCPs), as necessary and appropriate.	Designated in Bexar County as 247 acres in 1 unit.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and Critical Habitat occurs within the plan area of the Southern Edwards Plateau HCP. At this time, LCRA TSC does not expect to perform LCRA TSC Activities involving New Construction in Bexar County. Therefore, Covered Activities are not expected to occur within this unit of Critical Habitat (see HCP Chapter 6.3.2).
24.	*Cicurina vespera*	Government Canyon Bat Cave meshweaver	Arachnids	E	No	No	No	Not an HCP Covered Species. HCP includes a commitment to rely on other mechanisms for ESA compliance (e.g., Section 7 interagency consultation or other	Designated in Bexar County as 100 acres in 1 unit.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and Critical Habitat occurs within the plan area of the Southern Edwards Plateau HCP. At this

								existing HCPs), as necessary and appropriate.					time, LCRA TSC does not expect to perform LCRA TSC Activities involving New Construction in Bexar County. Therefore, Covered Activities are not expected to occur within this unit of Critical Habitat (see HCP Chapter 6.3.2).
25.	*Tayshaneta microps*	Government Canyon Bat Cave spider	Arachnids	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.05% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features, and Mitigation of up to 2 Conservation Credit (see HCP Chapter 6 and Appendix D).	Designated in Bexar County as 100 acres in 1 unit.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and Critical Habitat occurs within the plan area of the Southern Edwards Plateau HCP. At this time, LCRA TSC does not expect to perform LCRA TSC Activities involving New Construction in Bexar County. Therefore, Covered Activities are not expected to occur within this unit of Critical Habitat (see HCP Chapter 6.3.2).
26.	*Cicurina madla*	Madla Cave meshweaver	Arachnids	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.05% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features, and Mitigation of up to 2 Conservation Credits (see HCP Chapter 6 and Appendix D).	Designated in Bexar County as 1,884 acres in 12 units.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and Critical Habitat occurs within the plan area of the Southern Edwards Plateau HCP. At this time, LCRA TSC does not expect to perform LCRA TSC Activities involving New Construction in Bexar County. Therefore, Covered Activities are not expected to occur within this unit of Critical Habitat (see HCP Chapter 6.3.2).
27.	*Cicurina baronia*	Robber Baron Cave meshweaver	Arachnids	E	No	No	No	Not an HCP Covered Species. HCP includes a commitment to rely on other mechanisms for ESA compliance (e.g., Section 7 interagency consultation or other existing HCPs), as necessary and appropriate.	Designated in Bexar County as 100 acres in 1 unit.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and Critical Habitat occurs within the plan area of the Southern Edwards Plateau HCP. At this time, LCRA TSC does not expect to perform LCRA TSC Activities involving New Construction in Bexar County. Therefore, Covered Activities are not expected to occur within this unit of Critical Habitat (see HCP Chapter 6.3.2).
28.	*Cicurina loftini*	no common name	Arachnids	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species. May not be a valid taxon (see HCP Appendix B).	No	N/A	N/A	N/A	
29.	*Tartarocreagris texana*	Tooth Cave pseudoscorpion	Arachnids	E	No	No	No	Not an HCP Covered Species. HCP includes a commitment to rely on other mechanisms for ESA compliance (e.g., Section 7 interagency consultation or other existing HCPs), as necessary and appropriate.	No	N/A	N/A	N/A	
30.	*Tayshaneta myopica*	Tooth Cave spider	Arachnids	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.1% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features, and Mitigation of up to 2 Conservation Credits (see HCP Chapter 6 and Appendix D).	No	N/A	N/A	N/A	
31.	*Falco peregrinus anatum*	American peregrine falcon	Birds	Delisted	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
32.	*Falco peregrinus tundrius*	Arctic peregrine falcon	Birds	Delisted	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	

33.	*Tympanuchus cupido attwateri*	Attwater's greater prairie-chicken	Birds	E	No	No	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
34.	*Peucaea aestivalis*	Bachman's sparrow	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
35.	*Haliaeetus leucocephalus*	Bald eagle	Birds	Delisted	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
36.	*Laterallus jamaicensis*	Black rail	Birds	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
37.	*Vireo atricapilla*	Black-capped vireo	Birds	Delisted	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
38.	*Pelecanus occidentalis*	Brown pelican	Birds	Delisted	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
39.	*Glaucidium brasilianum cactorum*	Cactus ferruginous pygmy-owl	Birds	Delisted	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
40.	*Buteogallus anthracinus*	Common black-hawk	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
41.	*Numenius borealis*	Eskimo curlew	Birds	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
42.	*Setophaga chrysoparia*	Golden-cheeked warbler	Birds	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects no more than 0.2% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures, and Mitigation of up to 6,384 Conservation Credits (see HCP Chapter 6 and Appendix D).	No	N/A	N/A	N/A	
43.	*Vermivora chrysoptera*	Golden-winged warbler	Birds	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
44.	*Buteo plagiatus (syn. Asturina nitida)*	Gray hawk	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
45.	*Sterna antillarum athalassos*	Interior least tern	Birds	E	No	No	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
46.	*Tympanuchus pallidicinctus*	Lesser prairie-chicken	Birds	Petitioned for Listing as E with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
47.	*Strix occidentalis lucida*	Mexican spotted owl	Birds	T	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated -Not in Plan Area	N/A	N/A	N/A	
48.	*Falco femoralis septentrionalis*	Northern aplomado falcon	Birds	E, Petitioned for Critical Habitat:	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities and	Petitioned	N/A	N/A	N/A	

				Findings Not Yet Made				with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.					
49.	*Camptostoma imberbe*	Northern beardless-tyrannulet	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
50.	*Charadrius melodus*	Piping plover	Birds	T	Yes	No	No	HCP Covered Species. Incidental take authorization affects no more than 0.05% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures, and Mitigation of up to 11 Conservation Credits (see HCP Chapter 6 and Appendix D).	Designated in Cameron, Willacy, Kenedy, Kleberg, Nueces, Aransas, Calhoun, Matagorda, Galveston, San Patricio, and Brazoria Counties, Texas. In Texas, Critical Habitat totals 139,029 acres in 37 units.	Yes	No	No	Existing LCRA TSC Facilities cross Critical Habitat for this species. HCP includes General Minimization Measures and Species-specific Minimization Measures and a Special Cases Enrollment Scenario for assessing greater amounts of Mitigation for impacts within Critical Habitat that minimize any alterations to Critical Habitat (see HCP Chapter 6 and Appendix D). Critical Habitat is dispersed across 37 separate units, which isolate potential alterations to only the affected unit(s).
51.	*Calidris canutus rufa*	Red knot	Birds	T	Yes	No	No	HCP Covered Species. Incidental take authorization affects no more than 0.05% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures, and Mitigation of up to 11 Conservation Credits (see HCP Chapter 6 and Appendix D).	No	N/A	N/A	N/A	
52.	*Picoides borealis*	Red-cockaded woodpecker	Birds	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.01% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures, and Mitigation of up to 270 Conservation Credits (see HCP Chapter 6 and Appendix D).	No	N/A	N/A	N/A	
53.	*Amazona viridigenalis*	Red-crowned parrot	Birds	Candidate	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
54.	*Egretta rufescens*	Reddish egret	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
55.	*Pachyramphus aglaiae*	Rose-throated becard	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
56.	*Sterna fuscata*	Sooty tern	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
57.	*Empidonax traillii extimus*	Southwestern willow flycatcher	Birds	E, Petitioned for Delisting: 90 Day Substantial	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities (species is a rare occurrence in Texas) and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated -Not in Plan Area	N/A	N/A	N/A	
58.	*Elanoides forficatus*	Swallow-tailed kite	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
59.	*Peucaea botterii texana*	Texas Botteri's sparrow	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
60.	*Setophaga pitiayumi*	Tropical parula	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
61.	*Coccyzus americanus*	Western yellow-billed cuckoo	Birds	T	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities (species is a rare occurrence in Texas) and with application of HCP	Proposed in Hudspeth, Presidio, and Brewster Counties, Texas, as 9,053 acres in 2 units.	No	N/A	No	No existing LCRA TSC Facilities occur in proposed Critical Habitat and the known range and distribution of Covered Species do not co-occur with proposed Critical Habitat. Covered Activities are

								General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.					not likely to impact proposed Critical Habitat for this species.
62.	*Plegadis chihi*	White-faced ibis	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
63.	*Geranoaetus (syn. Buteo) albicaudatus*	White-tailed hawk	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
64.	*Grus americana*	Whooping crane	Birds	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 1% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures including line marking, and Mitigation of up to 447 Conservation Credits (see HCP Chapter 6 and Appendix D).	Designated in Aransas, Refugio, and Calhoun Counties, Texas, as 472,435 acres in 1 unit.	Yes	No	No	No existing LCRA TSC Facilities occur in Critical Habitat for this species. HCP includes General Minimization Measures (including line markers) and Species-specific Minimization Measures and a Special Cases Enrollment Scenario for assessing greater amounts of Mitigation for impacts within Critical Habitat that minimize any alterations to Critical Habitat (see HCP Chapter 6 and Appendix D).
65.	*Mycteria americana*	Wood stork	Birds	T	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
66.	*Buteo albonotatus*	Zone-tailed hawk	Birds	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
67.	*Gammarus hyalelloides*	Diminutive amphipod	Crustaceans	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Reeves and Jeff Davis Counties, Texas as 3.7 acres in 4 units.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and the known range and distribution of Covered Species do not co-occur with Critical Habitat. Covered Activities are not likely to impact proposed Critical Habitat for this species.
68.	*Orconectes maletae*	Kisatchie painted crayfish	Crustaceans	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
69.	*Stygobromus pecki*	Peck's cave amphipod	Crustaceans	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 1% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures including avoidance of Occupied and Assumed Occupied Spring and Karst Features, and Mitigation of up to 1 Conservation Credit (see HCP Chapter 6 and Appendix D).	Designated in Comal and Hays Counties, Texas, as 138 acres in 2 units with surface and subsurface components.	Yes	No	No	Existing LCRA TSC Facilities occur in Critical Habitat for this species. HCP includes General Minimization Measures (including waterway protection and avoidance of Occupied or Assumed Occupied Spring Features) and Species-specific Minimization Measures and a Special Cases Enrollment Scenario for assessing greater amounts of Mitigation for impacts within Critical Habitat that minimize the magnitude of alterations to Critical Habitat (see HCP Chapter 6 and Appendix D). Critical Habitat is dispersed across 2 separate units, which isolate potential alterations to only the affected unit(s).
70.	*Gammarus pecos*	Pecos amphipod	Crustaceans	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Pecos County, Texas, as 178.6 acres in 1 unit.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and the known range and distribution of Covered Species do not co-occur with Critical Habitat. Covered Activities are not likely to impact proposed Critical Habitat for this species.

71.	*Procambarus regalis*	Regal burrowing crayfish	Crustaceans	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
72.	*Notropis girardi*	Arkansas River shiner	Fishes	T	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated -Not in Plan Area	N/A	N/A	N/A	
73.	*Macrhybopsis tetranema*	Arkansas River speckled chub	Fishes	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
74.	*Gambusia gaigei*	Big Bend gambusia	Fishes	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities. See HCP Appendix B.	No	N/A	N/A	N/A	
75.	*Percina maculata*	Blackside darter	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
76.	*Gambusia senilis*	Blotched gambusia	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
77.	*Cycleptus elongatus*	Blue sucker	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
78.	*Pteronotropis hubbsi*	Bluehead shiner	Fishes	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
79.	*Notropis simus simus*	Bluntnose shiner	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
80.	*Ictalurus sp. 1*	Chihuahua catfish	Fishes	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
81.	*Notropis chihuahua*	Chihuahua shiner	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
82.	*Gambusia heterochir*	Clear Creek gambusia	Fishes	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
83.	*Cyprinodon elegans*	Comanche Springs pupfish	Fishes	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
84.	*Cyprinodon eximius*	Conchos pupfish	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
85.	*Dionda diaboli*	Devils River minnow	Fishes	T	No	N/A		Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Val Verde and Kinney Counties, Texas, as 16.5 stream miles in 2 units.	Yes	No	No	Existing LCRA TSC Facilities cross Critical Habitat for this species. Not a Covered Species due to the very low likelihood of modifying the aquatic habitat used by this species (see HCP Appendix B). Impacts to surface Critical Habitat are minimized by HCP General Minimization Measures related to waterway protection (see HCP Chapter 6.4.1).

86.	*Etheostoma fonticola*	Fountain darter	Fishes	E	No	N/A		Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Hays County, Texas as 70 acres in 1 unit.	Yes	No	No	Existing LCRA TSC Facilities cross Critical Habitat for this species. Not a Covered Species due to the very low likelihood of modifying the aquatic habitat used by this species (see HCP Appendix B). Impacts to surface Critical Habitat are minimized by HCP General Minimization Measures related to waterway protection (see HCP Chapter 6.4.1).
87.	*Cyprinodon bovinus*	Leon Springs pupfish	Fishes	E	No	N/A		Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Pecos County, Texas in 1 unit.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and the known range and distribution of Covered Species do not co-occur with Critical Habitat. Covered Activities are not likely to impact proposed Critical Habitat for this species.
88.	*Ctenogobius claytonii*	Mexican goby	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
89.	*Campostoma ornatum*	Mexican stoneroller	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
90.	*Cyprinella sp. 2*	Nueces shiner	Fishes	Petitioned for Listing: 12 Month Not Warranted	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
91.	*Microphis brachyurus*	Opossum pipefish	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
92.	*Polyodon spathula*	Paddlefish	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
93.	*Gambusia nobilis*	Pecos gambusia	Fishes	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
94.	*Cyprinodon pecosensis*	Pecos pupfish	Fishes	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
95.	*Cyprinella lepida*	Plateau shiner	Fishes	Petitioned for Listing: 12 Month Not Warranted	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
96.	*Macrhybopsis australis*	Prairie chub	Fishes	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
97.	*Cyprinella proserpina*	Proserpine shiner	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
98.	*Gila pandora*	Rio Grande chub	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
99.	*Etheostoma grahami*	Rio Grande darter	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
100.	*Hybognathus amarus*	Rio Grande silvery minnow	Fishes	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given likely extirpation from Texas. See HCP Appendix B.	Designated -Not in Plan Area	N/A	N/A	N/A	
101.	*Awaous banana*	River goby	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
102.	*Fundulus jenkinsi*	Saltmarsh topminnow	Fishes	Petitioned for Listing: 90	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	

				Day Substantial									
103.	*Gambusia clarkhubbsi*	San Felipe gambusia	Fishes	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
104.	*Gambusia georgei*	San Marcos gambusia	Fishes	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given presumed extinction in the wild. See HCP Appendix B.	Designated in Hays County, Texas as 43 acres in 1 unit.	Yes	No	No	No existing LCRA TSC Facilities occur in Critical Habitat for this species. Not a Covered Species due to the very low likelihood of modifying the aquatic habitat used by this species (see HCP Appendix B). Impacts to surface Critical Habitat are minimized by HCP General Minimization Measures related to waterway protection (see HCP Chapter 6.4.1).
105.	*Notropis oxyrhynchus*	Sharpnose shiner	Fishes	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Baylor, Crosby, Fisher, Garza, Haskell, Kent, King, Knox, Stonewall, Throckmorton, and Young Counties, Texas as 1,002 river miles in 5 units.	Yes	No	No	No existing LCRA TSC Facilities occur in Critical Habitat for this species. Not a Covered Species due to the very low likelihood of modifying the aquatic habitat used by this species (see HCP Appendix B). Impacts to surface Critical Habitat are minimized by HCP General Minimization Measures related to waterway protection (see HCP Chapter 6.4.1).
106.	*Scaphirhynchus platorynchus*	Shovelnose sturgeon	Fishes	T- Similarity of appearance to the pallid sturgeon (*Scaphirhynchus albus*)[1]	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
107.	*Notropis buccula*	Smalleye shiner	Fishes	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Baylor, Crosby, Fisher, Garza, Haskell, Kent, King, Knox, Stonewall, Throckmorton, and Young Counties, Texas as 1,002 river miles in 5 units.	Yes	No	No	No existing LCRA TSC Facilities occur in Critical Habitat for this species. Not a Covered Species due to the very low likelihood of modifying the aquatic habitat used by this species (see HCP Appendix B). Impacts to surface Critical Habitat are minimized by HCP General Minimization Measures related to waterway protection (see HCP Chapter 6.4.1).
108.	*Pristis pectinata*	Smalltooth sawfish	Fishes	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given likely extirpation from Texas. See HCP Appendix B.	No	N/A	N/A	N/A	
109.	*Trogloglanis pattersoni*	Toothless blindcat	Fishes	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
110.	*Erimyzon oblongus*	Western Creek chubsucker	Fishes	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
111.	*Satan eurystomus*	Widemouth blindcat	Fishes	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
112.	*Rhadine exilis*	A ground beetle	Insects	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.05% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and	Designated in Bexar County as 2,363 acres in 15 units.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and Critical Habitat occurs within the plan area of the Southern Edwards Plateau HCP. At this

[1] USFWS. 2010. Threatened status for shovelnose sturgeon under the similarity of appearance provisions of the E Species Act. Washington, D.C.

								Species-specific Minimization Measures, and Mitigation of up to 2 Conservation Credit (see HCP Chapter 6 and Appendix D).					time, LCRA TSC does not expect to perform LCRA TSC Activities involving New Construction in Bexar County. Therefore, Covered Activities are not expected to occur within this Critical Habitat (see HCP Chapter 6.3.2).
113.	*Rhadine infernalis*	A ground beetle	Insects	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.05% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures, and Mitigation of up to 2 Conservation Credit (see HCP Chapter 6 and Appendix D).	Designated in Bexar County as 2,955 acres in 19 units.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and Critical Habitat occurs within the plan area of the Southern Edwards Plateau HCP. At this time, LCRA TSC does not expect to perform LCRA TSC Activities involving New Construction in Bexar County. Therefore, Covered Activities are not expected to occur within this Critical Habitat (see HCP Chapter 6.3.2).
114.	*Nicrophorus americanus*	American burying beetle	Insects	E, Petitioned for Delisting: 90 Day Substantial	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities. See HCP Appendix B.	No	N/A	N/A	N/A	
115.	*Batrisodes texanus*	Inner Space Cavern mold beetle	Insects	E	No	No	No	Not an HCP Covered Species. HCP includes a commitment to rely on other mechanisms for ESA compliance (e.g., Section 7 interagency consultation or other existing HCPs), as necessary and appropriate.	No	N/A	N/A	N/A	
116.	*Batrisodes cryptotexanus*	Dragonfly Cave mold beetle	Insects	-	No	No	No	Not an HCP Covered Species. HCP includes a commitment to rely on other mechanisms for ESA compliance (e.g., Section 7 interagency consultation or other existing HCPs), as necessary and appropriate.	No	N/A	N/A	N/A	
117.	*Stygoparnus comalensis*	Comal Springs dryopid beetle	Insects	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities. See HCP Appendix B.	Designated in Comal and Hays Counties, Texas, as 139 acres in 2 units.	Yes	No	No	Existing LCRA TSC Facilities occur in Critical Habitat for this species. HCP includes General Minimization Measures (including waterway protection and avoidance of Occupied or Assumed Occupied Spring Features) and Species-specific Minimization Measures and a Special Cases Enrollment Scenario for assessing greater amounts of Mitigation for impacts within Critical Habitat that minimize the magnitude of alterations to Critical Habitat (see HCP Chapter 6 and Appendix D). Critical Habitat is dispersed across 2 separate units, which isolate potential alterations to only the affected unit(s).
118.	*Heterelmis comalensis*	Comal Springs riffle beetle	Insects	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.01% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures including avoidance of Occupied and Assumed Occupied Spring and Karst Features, and Mitigation of up to 1 Conservation Credits (see HCP Chapter 6 and Appendix D).	Designated in Comal and Hays Counties, Texas, as 54 acres in 2 units.	Yes	No	No	Existing LCRA TSC Facilities occur in Critical Habitat for this species. HCP includes General Minimization Measures (including waterway protection and avoidance of Occupied or Assumed Occupied Spring Features) and Species-specific Minimization Measures and a Special Cases Enrollment Scenario for assessing greater amounts of Mitigation for impacts within Critical Habitat that minimize the magnitude of alterations to Critical Habitat (see

													HCP Chapter 6 and Appendix D). Critical Habitat is dispersed across 2 separate units, which isolate potential alterations to only the affected unit(s).
119.	*Haideoporus texanus*	Edwards Aquifer diving beetle	Insects	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
120.	*Batrisodes venyivi*	Helotes mold beetle	Insects	E	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.05% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures, and Mitigation of up to 2 Conservation Credit (see HCP Chapter 6 and Appendix D).	Designated in Bexar County as 595 acres in 3 units.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and Critical Habitat occurs within the plan area of the Southern Edwards Plateau HCP. At this time, LCRA TSC does not expect to perform LCRA TSC Activities involving New Construction in Bexar County. Therefore, Covered Activities are not expected to occur within this Critical Habitat (see HCP Chapter 6.3.2).
121.	*Texamaurops reddelli*	Kretschmarr Cave mold beetle	Insects	E	No	No	No	Not an HCP Covered Species. HCP includes a commitment to rely on other mechanisms for ESA compliance (e.g., Section 7 interagency consultation or other existing HCPs), as necessary and appropriate.	No	N/A	N/A	N/A	
122.	*Automeris louisiana*	Louisiana eyed silkmoth	Insects	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
123.	*Danaus plexippus plexippus*	Monarch butterfly	Insects	Petitioned for Listing T with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
124.	*Lepidostoma morsei*	Morse's little plain brown sedge	Insects	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
125.	*Somatochlora margarita*	Texas emerald	Insects	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
126.	*Lirceolus smithii*	Texas troglobitic water slater	Insects	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
127.	*Rhadine persephone*	Tooth Cave ground beetle	Insects	E	No	No	No	HCP Covered Species. Incidental take authorization affects less than 0.15% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features, and Mitigation of up to 2 Conservation Credits (see HCP Chapter 6 and Appendix D).	No	N/A	N/A	N/A	
128.	*Ursus americanus*	Black bear	Mammals	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	

129.	*Mustela nigripes*	Black-footed ferret	Mammals	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given extirpation from Texas. See HCP Appendix B.	Designated -Not in Plan Area	N/A	N/A	N/A	
130.	*Oryzomys couesi*	Coues' rice rat	Mammals	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
131.	*Herpailurus yagouaroundi cacomitli*	Gulf Coast jaguarundi	Mammals	E, Petitioned for Critical Habitat: Findings Not Yet Made	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given possible extirpation from Texas. See HCP Appendix B.	Petitioned	N/A	N/A	N/A	
132.	*Canis lupus*	Gray wolf	Mammals	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given extirpation from Texas. See HCP Appendix B.	Designated -Not in Plan Area	N/A	N/A	N/A	
133.	*Panthera onca*	Jaguar	Mammals	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given lack of documented localities and at best extreme rarity in Texas. See HCP Appendix B.	Designated -Not in Plan Area	N/A	N/A	N/A	
134.	*Ursus americanus luteolus*	Louisiana black bear	Mammals	Delisted	N/A	N/A	N/A	Species has been delisted.	No	N/A	N/A	N/A	
135.	*Leopardus wiedii*	Margay	Mammals	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
136.	*Leptonycteris nivalis*	Mexican long-nosed bat	Mammals	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities. See HCP Appendix B.	No	N/A	N/A	N/A	
137.	*Leopardus pardalis*	Ocelot	Mammals	E, Petitioned for Critical Habitat: Findings Not Yet Made	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.01% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures, and Mitigation of up to 165 Conservation Credits (see HCP Chapter 6 and Appendix D).	Petitioned	N/A	N/A	N/A	
138.	*Peromyscus truei comanche*	Palo Duro mouse	Mammals	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
139.	*Corynorhinus rafinesquii*	Rafinesque's big-eared bat	Mammals	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
140.	*Canis rufus*	Red wolf	Mammals	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given extirpation from Texas. See HCP Appendix B.	No	N/A	N/A	N/A	
141.	*Lasiurus ega*	Southern yellow bat	Mammals	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
142.	*Euderma maculatum*	Spotted bat	Mammals	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
143.	*Dipodomys elator*	Texas kangaroo rat	Mammals	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
144.	*Perimyotis subflavus*	Tri-colored bat	Mammals	Petitioned for Listing: Under review	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
145.	*Trichechus manatus*	West Indian manatee	Mammals	E, Petitioned for increased protections: Findings Not Yet Made; Petition to Revise Critical Habitat: 90 Day	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities. See HCP Appendix B.	Designated -Not in Plan Area	N/A	N/A	N/A	

				Substantial; Petition for Downlisting: 90 Day Substantial									
146.	*Nasua narica*	White-nosed coati	Mammals	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
147.	*Pseudotryonia adamantina*	Diamond tryonia	Mollusks	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Pecos County, Texas as 178.6 acres in 1 unit.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and the known range and distribution of Covered Species do not co-occur with Critical Habitat. Covered Activities are not likely to impact proposed Critical Habitat for this species.
148.	*Fusconaia (syn. Quincuncina) mitchelli*	False spike	Mollusks	Petitioned for Listing: 90 Day Substantial	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
149.	*Radiocentrum ferrissi*	Fringed mountainsnail	Mollusks	Petitioned for Listing: 90 Day Not Substantial	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
150.	*Quadrula aurea*	Golden orb	Mollusks	Candidate	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
151.	*Tryonia circumstriata*	Gonzales tryonia	Mollusks	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Pecos County, Texas as 178.6 acres in 1 unit.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and the known range and distribution of Covered Species do not co-occur with Critical Habitat. Covered Activities are not likely to impact proposed Critical Habitat for this species.
152.	*Pleurobema riddellii*	Louisiana pigtoe	Mollusks	Petitioned for Listing: 90 Day Substantial	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
153.	*Truncilla cognata*	Mexican fawnsfoot	Mollusks	Petitioned for Listing: 90 Day Substantial	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
154.	*Phreatodrobia imitata*	Mimic cavesnail	Mollusks	Petitioned for Listing: 90 Day Substantial	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
155.	*Arkansia wheeleri*	Ouachita rock pocketbook	Mollusks	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General	No	N/A	N/A	N/A	

								Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.					
156.	*Assiminea pecos*	Pecos assiminea snail	Mollusks	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Reeves and Jeff Davis Counties, Texas as 444.4 acres in 2 units.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and the known range and distribution of Covered Species do not co-occur with Critical Habitat. Covered Activities are not likely to impact proposed Critical Habitat for this species.
157.	*Pyrgulopsis texana*	Phantom Cave springsnail	Mollusks	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Reeves and Jeff Davis Counties, Texas as 3.7 acres in 4 units.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and the known range and distribution of Covered Species do not co-occur with Critical Habitat. Covered Activities are not likely to impact proposed Critical Habitat for this species.
158.	*Tryonia cheatumi*	Phantom tryonia	Mollusks	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	Designated in Reeves and Jeff Davis Counties, Texas as 3.7 acres in 4 units.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and the known range and distribution of Covered Species do not co-occur with Critical Habitat. Covered Activities are not likely to impact proposed Critical Habitat for this species.
159.	*Potamilus metnecktayi*	Salina mucket	Mollusks	Petitioned for Listing: Findings Not Yet Made	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
160.	*Lampsilis satura*	Sandbank pocketbook	Mollusks	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
161.	*Quadrula houstonensis*	Smooth pimpleback	Mollusks	Candidate	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
162.	*Obovaria jacksoniana*	Southern hickorynut	Mollusks	-	N/A	N/A		Species not federally listed—jeopardy analysis does not apply.	No	N/A	N/A	N/A	
163.	*Lampsilis bracteata*	Texas fatmucket	Mollusks	Candidate	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
164.	*Truncilla macrodon*	Texas fawnsfoot	Mollusks	Candidate	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
165.	*Potamilus amphichaenus*	Texas heelsplitter	Mollusks	Petitioned for Listing: Findings Not Yet Made	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
166.	*Popenaias popeii*	Texas hornshell	Mollusks	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General	No	N/A	N/A	N/A	

								Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.					
167.	*Fusconaia askewi*	Texas pigtoe	Mollusks	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
168.	*Quadrula petrina*	Texas pimpleback	Mollusks	Candidate	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
169.	*Fusconaia lananensis*	Triangle pigtoe	Mollusks	Petitioned for Listing: 90 Day Substantial	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities, low potential for impact, and with application of HCP General Minimization Measures. See HCP Chapter 6.4.1 and Appendix B.	No	N/A	N/A	N/A	
170.	*Thymophylla tephroleuca*	Ashy dogweed	Plants	E	No	N/A	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species. However, LCRA TSC has Facilities within the range of this species. To the extent practicable, LCRA TSC will voluntarily seek to avoid impacts to this species that may be associated with LCRA TSC Activities that are not Covered Activities by coordinating with USFWS to avoid known populations and coordinating with National Wildlife Refuge staff when crossing Refuge properties. With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.	No	N/A	N/A	N/A	
171.	*Salvia pentstemonoides*	Big red sage	Plants	Petitioned for Listing: 90 Day Substantial	Yes	No	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
172.	*Echinocereus reichenbachii var albertii*	Black lace cactus	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include raising mowing heights to no less than 8 inches, deferring Disturbances until outside of the seasonal blooming period (avoid the period between April and June), and minimizing	No	N/A	N/A	N/A	

								subsurface Disturbances near waterways. With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.					
173.	*Streptanthus bracteatus*	Bracted twistflower	Plants	Candidate	Yes	No	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
174.	*Genistidium dumosum*	Brush-pea	Plants	Petitioned for Listing: 90 Day Substantial	No	N/A	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
175.	*Coryphantha ramillosa*	Bunched Cory cactus	Plants	T	No	N/A	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species. However, LCRA TSC may have Facilities within the range of this species. To the extent practicable, LCRA TSC will voluntarily seek to avoid impacts to this species that may be associated with LCRA TSC Activities that are not Covered Activities by coordinating with USFWS to avoid known populations on federal lands, and within the limits of previously documented populations raising mowing heights to no less than 8 inches and deferring Disturbances until outside of the seasonal blooming period (avoid the period between August and November).	No	N/A	N/A	N/A	
176.	*Paronychia congesta*	Bushy whitlowwort	Plants	Petitioned for Listing: 90 Day Substantial	No	N/A	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
177.	*Pediomelum pentaphyllum*	Chihuahua scurfpea	Plants	Petitioned for Listing: 90 Day Substantial	No	N/A	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
178.	*Hexalectris revoluta*	Chisos coralroot	Plants	Petitioned for Listing: 90 Day Substantial	No	N/A	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
179.	*Echinocereus chisoensis var chisoensis*	Chisos Mountains hedgehog cactus	Plants	T	No	N/A	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species. However, LCRA TSC may have Facilities within the range of this species. To the extent practicable, LCRA TSC will voluntarily seek to avoid impacts to this species that may be associated with LCRA TSC Activities that are not Covered Activities by coordinating with USFWS to avoid known populations on federal lands, and within the limits of previously documented populations raising mowing heights to no less than 8 inches and	No	N/A	N/A	N/A	

								deferring Disturbances until outside of the seasonal blooming period (avoid the period between March and April).					
180.	*Physostegia correllii*	Correll's false dragon-head	Plants	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No	No	This species is not federally listed and a jeopardy analysis is not required.	Petitioned	N/A	N/A	N/A	
181.	*Cyperus cephalanthus*	Cryptic flatsedge	Plants	Petitioned for Listing: 90 Day Not Substantial	Yes	No	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
182.	*Echinocereus davisii*	Davis' green pitaya	Plants	E	No	N/A	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species. However, LCRA TSC may have Facilities within the range of this species. To the extent practicable, LCRA TSC will voluntarily seek to avoid impacts to this species that may be associated with LCRA TSC Activities that are not Covered Activities by coordinating with USFWS to avoid known populations on federal lands, and within the limits of previously documented populations deferring Disturbances until outside of the seasonal blooming period (avoid the period between March and April).	No	N/A	N/A	N/A	
183.	*Donrichardsia macroneuron*	Don Richard's spring moss	Plants	Petitioned for Listing: 90 Day Substantial	Yes	No	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
184.	*Geocarpon minimum*	Earth fruit (Tinytim)	Plants	T	No	N/A	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species. However, LCRA TSC may have Facilities within the range of this species. To the extent practicable, LCRA TSC will voluntarily seek to avoid impacts to this species that may be associated with LCRA TSC Activities that are not Covered Activities by avoiding previously documented populations, particularly those that occur on protected or public lands.	No	N/A	N/A	N/A	
185.	*Festuca ligulata*	Guadalupe fescue	Plants	E	No	N/A		Exposure to Covered Activities is not expected due to the remote and restricted range that does not overlap with the known range or distribution of any Covered Species or existing LCRA TSC Facilities. Covered Activities will have no effect on this species.	Designated in Brewster County, Texas, as 7,815 acres in 5 subunits.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and the known range and distribution of Covered Species do not co-occur with Critical Habitat. Covered Activities are not likely to impact proposed Critical Habitat for this species.
186.	*Schoenoplectus hallii*	Hall's bulrush	Plants	Petitioned for Listing with Critical Habitat: 90	No	N/A	No	This species is not federally listed and a jeopardy analysis is not required.	Petitioned	N/A	N/A	N/A	

				Day Substantial									
187.	*Fissidens hallii*	Hall's pocket moss	Plants	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No	No	This species is not federally listed and a jeopardy analysis is not required.	Petitioned	N/A	N/A	N/A	
188.	*Quercus hinckleyi*	Hinckley's oak	Plants	T	No	N/A	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species. However, LCRA TSC may have Facilities within the range of this species. To the extent practicable, LCRA TSC will voluntarily seek to avoid impacts to this species that may be associated with LCRA TSC Activities that are not Covered Activities by coordinating with USFWS to avoid known populations on federal lands.	No	N/A	N/A	N/A	
189.	*Frankenia johnstonii*	Johnston's frankenia	Plants	Delisted	N/A	N/A		This species has been delisted.	No	N/A	N/A	N/A	
190.	*Abronia macrocarpa*	Large-fruited sand-verbena	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming period (avoid the period between February and mid-June). With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.	No	N/A	N/A	N/A	
191.	*Agalinis calycina*	Leoncita false-foxglove	Plants	Petitioned for Listing: 90 Day Substantial	No	N/A	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
192.	*Potamogeton clystocarpus*	Little Aguja pondweed	Plants	E	No	N/A	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species.	No	N/A	N/A	N/A	
193.	*Sclerocactus mariposensis*	Lloyd's mariposa cactus	Plants	T	Yes	No	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with	No	N/A	N/A	N/A	

								the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species. However, LCRA TSC may have Facilities within the range of this species. To the extent practicable, LCRA TSC will voluntarily seek to avoid impacts to this species that may be associated with LCRA TSC Activities that are not Covered Activities by coordinating with USFWS to avoid known populations on federal lands.					
194.	*Agalinis navasotensis*	Navasota false foxglove	Plants	Petitioned for Listing: 90 Day Substantial	Yes	No	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
195.	*Spiranthes parksii*	Navasota ladies' tresses	Plants	E, Petitioned for Delisting: 90 Day Not Substantial	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species, particularly those on protected lands. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include raising mowing heights to no less than 12 inches and deferring Disturbances until outside of the seasonal blooming and seed-set period (avoid the period between October and December). With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.	No	N/A	N/A	N/A	
196.	*Hibiscus dasycalyx*	Neches River rose-mallow	Plants	T	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming period (avoid the period between June and August), and minimizing subsurface	Designated in Nacogdoches, Houston, Trinity, Cherokee, and Harrison Counties, Texas, as 166.5 acres in 11 units.	Yes	No	No	No existing LCRA TSC Facilities occur in Critical Habitat and the known range and most Critical Habitat Units are small (less than 10 acres) and may be readily avoided by Covered Activities. HCP General Minimization Measures also include measures to minimize impacts to listed plant species that also minimize impacts to Critical Habitat (see HCP Chapter 6.4.1). Critical Habitat is dispersed across 11 separate units, which isolate potential alterations to only the affected unit(s).

								Disturbances near waterways and wetlands. With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.					
197.	*Escobaria (syn. Coryphantha) minima*	Nellie Cory cactus	Plants	E	No	N/A	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species. However, LCRA TSC may have Facilities within the range of this species. To the extent practicable, LCRA TSC will voluntarily seek to avoid impacts to this species that may be associated with LCRA TSC Activities that are not Covered Activities by coordinating with USFWS to avoid known populations on federal lands.	No	N/A	N/A	N/A	
198.	*Helianthus paradoxus*	Pecos/Puzzle sunflower	Plants	T	No	N/A	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species. However, LCRA TSC has Facilities within the range of this species. To the extent practicable, LCRA TSC will voluntarily seek to avoid or minimize impacts to this species that may be associated with LCRA TSC Activities that are not Covered Activities by avoiding Disturbances within 50 feet of previously documented populations of this species or deferring Disturbances within the limits of known populations until outside of the seasonal blooming and seed-set period (avoid the period between June and November).	Designated in Pecos County, Texas, as 240 acres in 1 unit.	No	N/A	No	No existing LCRA TSC Facilities occur in Critical Habitat and the known range and distribution of Covered Species do not co-occur with Critical Habitat. Covered Activities are not likely to impact proposed Critical Habitat for this species.
199.	*Asclepias prostrata*	Prostrate milkweed	Plants	Petitioned for Listing: 90 Day Substantial	No	N/A	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
200.	*Symphyotrichum puniceum var. scabricaule*	Rough-stemmed aster	Plants	Petitioned for Listing with Critical Habitat: 90 Day Substantial	No	N/A	No	This species is not federally listed and a jeopardy analysis is not required.	Petitioned	N/A	N/A	N/A	
201.	*Helianthus occidentalis* ssp. *plantagineus*	Shinner's sunflower	Plants	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No	No	This species is not federally listed and a jeopardy analysis is not required.	Petitioned	N/A	N/A	N/A	
202.	*Hoffmannseggia tenella*	Slender rushpea	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis,	No	N/A	N/A	N/A	

								other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include raising mowing heights to no less than 8 inches or deferring Disturbances until outside of the seasonal blooming period (avoid the period between April and November). With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.					
203.	*Eriocaulon koernickianum*	Small-headed pipewort	Plants	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No	No	This species is not federally listed and a jeopardy analysis is not required.	Petitioned	N/A	N/A	N/A	
204.	*Ambrosia cheiranthifolia*	South Texas ambrosia	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming period (avoid the period between July and November). With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.	No	N/A	N/A	N/A	
205.	*Astrophytum asterias*	Star cactus	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing	No	N/A	N/A	N/A	

								the continued existence of this species. Such minimization measures may include raising mowing heights to no less than 5 inches. With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.					
206.	*Cryptantha crassipes*	Terlingua Creek cat's-eye	Plants	E	No	N/A	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species. However, LCRA TSC may have Facilities within the range of this species. To the extent practicable, LCRA TSC will voluntarily seek to avoid impacts to this species that may be associated with LCRA TSC Activities that are not Covered Activities by avoiding Disturbances within 50 feet of previously documented populations or raising mowing heights to no less than 12 inches.	No	N/A	N/A	N/A	
207.	*Ayenia limitaris*	Texas ayenia	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species, particularly populations on protected lands. With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.	No	N/A	N/A	N/A	
208.	*Leavenworthia texana*	Texas golden gladecress	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species; however, adverse effects are unlikely given the low likelihood of LCRA TSC Activities in the counties within the range of this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species, particularly monitored populations. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization	Designated in Sabine and San Augustine Counties, Texas, as 1,353 acres in 4 units.	Yes	No	No	No existing LCRA TSC Facilities occur in Critical Habitat. HCP General Minimization Measures also include measures to minimize impacts to listed plant species that also minimize impacts to Critical Habitat (see HCP Chapter 6.4.1). Critical Habitat is dispersed across 4 separate units, which isolate potential alterations to only the affected unit(s).

								measures may include avoiding the use of herbicides. With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.					
209.	*Callirhoe scabriuscula*	Texas poppy-mallow	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming and seed-set period (avoid the period between April and June). With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.	No	N/A	N/A	N/A	
210.	*Hymenoxys texana*	Texas prairie dawn	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species; however, adverse effects are unlikely given the low likelihood of LCRA TSC Activities in the counties within the range of this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.	No	N/A	N/A	N/A	
211.	*Bartonia texana*	Texas screwstem	Plants	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No	No	This species is not federally listed and a jeopardy analysis is not required.	Petitioned	N/A	N/A	N/A	
212.	*Styrax texanus (Syn. Styrax platanifolius ssp texanus)*	Texas snowbells	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are	No	N/A	N/A	N/A	

								not Covered Activities) within 50 feet of previously documented populations of this species, particularly populations on protected lands. With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.					
213.	*Phlox nivalis ssp texensis*	Texas trailing phlox	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species; however, adverse effects are unlikely given the low likelihood of LCRA TSC Activities in the counties within the range of this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include raising mowing heights to no less than 12 inches. With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.	No	N/A	N/A	N/A	
214.	*Trillium texanum*	Texas trillium	Plants	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No	No	This species is not federally listed and a jeopardy analysis is not required.	Petitioned	N/A	N/A	N/A	
215.	*Zizania texana*	Texas wild rice	Plants	E	No	N/A	No	This species is known to occur within the known range or distribution of Covered Species, but is an aquatic plant that is unlikely to be exposed to Covered Activities or other LCRA TSC Activities. The Covered Activities will have no effect on this species.	Designated in Hays County, Texas, as 85 acres in 1 unit.	Yes	No	No	Existing LCRA TSC Facilities cross Critical Habitat for this species. Very low likelihood of modifying the aquatic habitat used by this species (see HCP Appendix B). Impacts to Critical Habitat are minimized by HCP General Minimization Measures related to waterway protection (see HCP Chapter 6.4.1).
216.	*Amsonia tharpii*	Tharp's blue-star	Plants	Petitioned for Listing: 90 Day Substantial	No	N/A	No	This species is not federally listed and a jeopardy analysis is not required.	No	N/A	N/A	N/A	
217.	*Sclerocactus brevihamatus ssp. tobuschii*	Tobusch fishhook cactus	Plants	E, Proposed for Downlisting	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented	No	N/A	N/A	N/A	

								populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include raising mowing heights to no less than 5 inches. With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.					
218.	*Manihot walkerae*	Walker's manioc	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming period (avoid the period between April and September). With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.	No	N/A	N/A	N/A	
219.	*Physaria pallida*	White bladderpod	Plants	E	Yes	No	No	This species is known to occur within the known range or distribution of Covered Species and the Covered Activities may affect this species; however, adverse effects are unlikely given the low likelihood of LCRA TSC Activities in the counties within the range of this species. To the extent practicable, LCRA TSC will avoid performing Covered Activities (and, on a voluntary basis, other LCRA TSC Activities that are not Covered Activities) within 50 feet of previously documented populations of this species. Where avoidance is not practicable, LCRA TSC will implement those minimization measures during the conduct of Covered Activities that are necessary to avoid jeopardizing the continued existence of this species. Such minimization measures may include deferring Disturbances until outside of the seasonal blooming period (avoid the period between April and May).	No	N/A	N/A	N/A	

								With these avoidance and minimization measures, the Covered Activities are unlikely to appreciably reduce the likelihood of both survival and recovery of that species in the wild.					
220.	*Physaria thamnophila*	Zapata bladderpod	Plants	E	Yes	No	No	Exposure to Covered Activities is not expected since the known range of this species does not overlap with the known range or distribution of any Covered Species. The Covered Activities will have no effect on this species. However, LCRA TSC has Facilities within the range of this species. To the extent practicable, LCRA TSC will voluntarily seek to avoid impacts to this species that may be associated with LCRA TSC Activities that are not Covered Activities by coordinating with USFWS to avoid known populations and coordinating with National Wildlife Refuge staff when crossing Refuge properties.	Designated in Starr County, Texas, as 5,160 acres in 8 units.	No	N/A	N/A	Existing LCRA TSC Facilities cross Critical Habitat for this species, but the known range and distribution of Covered Species do not co-occur with Critical Habitat. Covered Activities are not likely to impact proposed Critical Habitat for this species.
221.	*Macrochelys temminckii*	Alligator snapping turtle	Reptiles	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	
222.	*Eretmochelys imbricata*	Atlantic hawksbill sea turtle	Reptiles	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities. See HCP Appendix B.	Designated -Not in Plan Area	N/A	N/A	N/A	
223.	*Coniophanes imperialis*	Black-striped snake	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
224.	*Nerodia harteri*	Brazos water snake	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
225.	*Graptemys caglei*	Cagle's map turtle	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
226.	*Trimorphodon vilkinsonii*	Chihuahuan Desert lyre snake	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
227.	*Kinosternon hirtipes murrayi*	Chihuahuan mud turtle	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
228.	*Nerodia paucimaculata*	Concho water snake	Reptiles	Delisted	N/A	N/A	N/A	Species has been delisted.	No	N/A	N/A	N/A	
229.	*Sceloporus arenicola*	Dunes sagebrush lizard	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
230.	*Chelonia mydas*	Green sea turtle	Reptiles	T	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities. See HCP Appendix B.	No	N/A	N/A	N/A	
231.	*Lepidochelys kempii*	Kemp's ridley sea turtle	Reptiles	E, Petitioned for Critical Habitat: Findings Not Yet Made	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities. See HCP Appendix B.	No	N/A	N/A	N/A	
232.	*Dermochelys coriacea*	Leatherback sea turtle	Reptiles	E	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities. See HCP Appendix B.	Designated -Not in Plan Area	N/A	N/A	N/A	
233.	*Caretta caretta*	Loggerhead sea turtle	Reptiles	T	No	N/A	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities. See HCP Appendix B.	Designated -Not in Plan Area	N/A	N/A	N/A	

234.	*Pituophis ruthveni*	Louisiana pine snake	Reptiles	T	Yes	No	No	Not an HCP Covered Species. Incidental take not likely given limited exposure to Covered Activities. See HCP Appendix B.	No	N/A	N/A	N/A	
235.	*Phrynosoma hernandesi*	Mountain short-horned lizard	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
236.	*Leptodeira septentrionalis septentrionalis*	Northern cat-eyed snake	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
237.	*Cemophora coccinea copei*	Northern scarlet snake	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
238.	*Crotaphytus reticulatus*	Reticulate collared lizard	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
239.	*Coleonyx reticulatus*	Reticulated gecko	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
240.	*Pseudemys gorzugi*	Rio Grande cooter	Reptiles	Petitioned for Listing: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
241.	*Liochlorophis vernalis*	Smooth green snake	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
242.	*Drymobius margaritiferus*	Speckled racer	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
243.	*Holbrookia lacerata*	Spot-tailed earless lizard	Reptiles	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No	No	HCP Covered Species. Incidental take authorization affects less than 0.1% of potential habitat (see HCP Table 15). HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures, and Mitigation of up to 492 Conservation Credits (see HCP Chapter 6 and Appendix D).	Petitioned	N/A	N/A	N/A	
244.	*Phrynosoma cornutum*	Texas horned lizard	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
245.	*Drymarchon melanurus erebennus*	Texas indigo snake	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
246.	*Cemophora coccinea lineri*	Texas scarlet snake	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
247.	*Gopherus berlandieri*	Texas tortoise	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
248.	*Crotalus horridus*	Timber rattlesnake	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
249.	*Tantilla cucullata*	Trans-Pecos black-headed snake	Reptiles	-	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	No	N/A	N/A	N/A	
250.	*Deirochelys reticularia miaria*	Western chicken turtle	Reptiles	Petitioned for Listing with Critical Habitat: 90 Day Substantial	N/A	N/A	N/A	Species not federally listed. Not an HCP Covered Species.	Petitioned	N/A	N/A	N/A	

APPENDIX H

Per-Acre Market Value of Rural Land by County

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APPENDIX H -- Per-Acre Market Value of Rural Land by County

Source: Texas Real Estate Center. 2018. Texas rural land prices for local land market areas. Texas A&M University. Available at: https://www.recenter.tamu.edu/data/rural-land. Accessed on February 16, 2018.

Plan Area County Name	TREC Land Market Area	2016 Tract Size (acres)	2016 Nominal Price Per Acre
Anderson	30	75	$ 3,300
Andrews	4	268	$ 926
Angelina	31	76	$ 3,030
Aransas	20	162	$ 3,112
Archer	12	200	$ 1,705
Armstrong	2	423	$ 1,058
Atascosa	18	100	$ 4,554
Austin	28	90	$ 6,091
Bandera	17	122	$ 7,452
Bastrop	26	90	$ 5,804
Baylor	12	200	$ 1,705
Bee	20	162	$ 3,112
Bell	25	102	$ 2,847
Bexar	18	100	$ 4,554
Blanco	17	122	$ 7,452
Borden	3	320	$ 1,200
Bosque	25	102	$ 2,847
Bowie	29	76	$ 2,457
Brazoria	28	90	$ 6,091
Brazos	27	86	$ 5,691
Brewster	8	1,280	$ 375
Briscoe	2	423	$ 1,058
Brooks	11	337	$ 2,300
Brown	13	139	$ 2,580
Burleson	27	86	$ 5,691
Burnet	16	109	$ 5,754
Caldwell	26	90	$ 5,804
Calhoun	21	107	$ 3,800
Callahan	13	139	$ 2,580
Cameron	32	163	$ 3,186
Camp	29	76	$ 2,457
Carson	2	423	$ 1,058
Castro	2	423	$ 1,058
Chambers	28	90	$ 6,091
Cherokee	30	75	$ 3,300
Childress	6	323	$ 1,000
Clay	12	200	$ 1,705
Coke	9	210	$ 1,575
Coleman	13	139	$ 2,580
Collin	24	68	$ 4,136
Collingsworth	6	323	$ 1,000
Colorado	19	85	$ 6,021
Comal	18	100	$ 4,554
Comanche	13	139	$ 2,580
Concho	9	210	$ 1,575
Cooke	22	70	$ 4,712
Coryell	25	102	$ 2,847
Cottle	6	323	$ 1,000
Crane	8	1,280	$ 375
Crockett	9	210	$ 1,575
Crosby	3	320	$ 1,200
Culberson	8	1,280	$ 375
Dallas	24	68	$ 4,136
Dawson	3	320	$ 1,200
De Witt	19	85	$ 6,021
Deaf Smith	2	423	$ 1,058
Delta	29	76	$ 2,457
Denton	24	68	$ 4,136
Dickens	6	323	$ 1,000

Plan Area County Name	TREC Land Market Area	2016 Tract Size (acres)	2016 Nominal Price Per Acre
Dimmit	11	337	$ 2,300
Donley	6	323	$ 1,000
Duval	11	337	$ 2,300
Eastland	13	139	$ 2,580
Ector	4	268	$ 926
Edwards	9	210	$ 1,575
Ellis	24	68	$ 4,136
Erath	13	139	$ 2,580
Falls	25	102	$ 2,847
Fannin	22	70	$ 4,712
Fayette	19	85	$ 6,021
Fisher	7	161	$ 1,349
Floyd	3	320	$ 1,200
Foard	12	200	$ 1,705
Fort Bend	28	90	$ 6,091
Franklin	29	76	$ 2,457
Freestone	25	102	$ 2,847
Frio	10	191	$ 3,598
Gaines	4	268	$ 926
Galveston	28	90	$ 6,091
Garza	3	320	$ 1,200
Gillespie	16	109	$ 5,754
Glasscock	9	210	$ 1,575
Goliad	20	162	$ 3,112
Gonzales	19	85	$ 6,021
Gray	2	423	$ 1,058
Grayson	22	70	$ 4,712
Gregg	30	75	$ 3,300
Grimes	27	86	$ 5,691
Guadalupe	18	100	$ 4,554
Hale	3	320	$ 1,200
Hall	6	323	$ 1,000
Hamilton	14	149	$ 3,207
Hansford	1	685	$ 2,204
Hardeman	12	200	$ 1,705
Harris	28	90	$ 6,091
Harrison	30	75	$ 3,300
Hartley	1	685	$ 2,204
Haskell	12	200	$ 1,705
Hays	26	90	$ 5,804
Hemphill	5	249	$ 1,291
Henderson	30	75	$ 3,300
Hidalgo	32	163	$ 3,186
Hill	25	102	$ 2,847
Hood	23	67	$ 5,965
Hopkins	29	76	$ 2,457
Houston	30	75	$ 3,300
Howard	4	268	$ 926
Hudspeth	8	1,280	$ 375
Hunt	24	68	$ 4,136
Hutchinson	5	249	$ 1,291
Irion	9	210	$ 1,575
Jack	12	200	$ 1,705
Jackson	21	107	$ 3,800
Jasper	31	76	$ 3,030
Jeff Davis	8	1,280	$ 375
Jefferson	28	90	$ 6,091
Jim Hogg	11	337	$ 2,300
Jim Wells	20	162	$ 3,112
Johnson	23	67	$ 5,965
Jones	7	161	$ 1,349

Plan Area County Name	TREC Land Market Area	2016 Tract Size (acres)	2016 Nominal Price Per Acre
Karnes	18	100	$ 4,554
Kaufman	24	68	$ 4,136
Kendall	17	122	$ 7,452
Kenedy	11	337	$ 2,300
Kent	6	323	$ 1,000
Kerr	17	122	$ 7,452
Kimble	15	138	$ 2,941
King	6	323	$ 1,000
Kinney	9	210	$ 1,575
Kleberg	20	162	$ 3,112
Knox	12	200	$ 1,705
La Salle	11	337	$ 2,300
Lamar	29	76	$ 2,457
Lamb	4	268	$ 926
Lampasas	14	149	$ 3,207
Lavaca	19	85	$ 6,021
Lee	26	90	$ 5,804
Leon	27	86	$ 5,691
Liberty	28	90	$ 6,091
Limestone	25	102	$ 2,847
Lipscomb	5	249	$ 1,291
Live Oak	20	162	$ 3,112
Llano	16	109	$ 5,754
Loving	8	1,280	$ 375
Lubbock	3	320	$ 1,200
Lynn	3	320	$ 1,200
Madison	27	86	$ 5,691
Martin	4	268	$ 926
Mason	16	109	$ 5,754
Matagorda	21	107	$ 3,800
Maverick	10	191	$ 3,598
Mcculloch	14	149	$ 3,207
Mclennan	25	102	$ 2,847
Mcmullen	11	337	$ 2,300
Medina	10	191	$ 3,598
Menard	15	138	$ 2,941
Midland	4	268	$ 926
Milam	26	90	$ 5,804
Mills	14	149	$ 3,207
Mitchell	7	161	$ 1,349
Montague	22	70	$ 4,712
Montgomery	28	90	$ 6,091
Moore	1	685	$ 2,204
Morris	29	76	$ 2,457
Motley	6	323	$ 1,000
Nacogdoches	30	75	$ 3,300
Navarro	25	102	$ 2,847
Nolan	7	161	$ 1,349
Nueces	20	162	$ 3,112
Ochiltree	1	685	$ 2,204
Oldham	5	249	$ 1,291
Palo Pinto	23	67	$ 5,965
Panola	30	75	$ 3,300
Parker	23	67	$ 5,965
Parmer	2	423	$ 1,058
Pecos	8	1,280	$ 375
Polk	31	76	$ 3,030
Potter	5	249	$ 1,291
Presidio	8	1,280	$ 375
Rains	24	68	$ 4,136
Randall	2	423	$ 1,058

Plan Area County Name	TREC Land Market Area	2016 Tract Size (acres)	2016 Nominal Price Per Acre
Reagan	9	210	$ 1,575
Real	15	138	$ 2,941
Red River	29	76	$ 2,457
Reeves	8	1,280	$ 375
Refugio	20	162	$ 3,112
Roberts	5	249	$ 1,291
Robertson	27	86	$ 5,691
Rockwall	24	68	$ 4,136
Runnels	7	161	$ 1,349
Rusk	30	75	$ 3,300
San Augustine	31	76	$ 3,030
San Jacinto	28	90	$ 6,091
San Patricio	20	162	$ 3,112
San Saba	14	149	$ 3,207
Schleicher	9	210	$ 1,575
Scurry	7	161	$ 1,349
Shackelford	12	200	$ 1,705
Shelby	30	75	$ 3,300
Smith	30	75	$ 3,300
Somervell	23	67	$ 5,965
Starr	11	337	$ 2,300
Stephens	12	200	$ 1,705
Sterling	9	210	$ 1,575
Stonewall	6	323	$ 1,000
Sutton	9	210	$ 1,575
Swisher	2	423	$ 1,058
Tarrant	23	67	$ 5,965
Taylor	7	161	$ 1,349
Terrell	8	1,280	$ 375
Terry	4	268	$ 926
Throckmorton	12	200	$ 1,705
Titus	29	76	$ 2,457
Tom Green	9	210	$ 1,575
Travis	26	90	$ 5,804
Trinity	31	76	$ 3,030
Tyler	31	76	$ 3,030
Upshur	29	76	$ 2,457
Upton	9	210	$ 1,575
Uvalde	10	191	$ 3,598
Val Verde	9	210	$ 1,575
Van Zandt	24	68	$ 4,136
Victoria	21	107	$ 3,800
Walker	28	90	$ 6,091
Waller	28	90	$ 6,091
Ward	8	1,280	$ 375
Washington	27	86	$ 5,691
Webb	11	337	$ 2,300
Wharton	21	107	$ 3,800
Wheeler	6	323	$ 1,000
Wichita	12	200	$ 1,705
Wilbarger	12	200	$ 1,705
Willacy	32	163	$ 3,186
Williamson	26	90	$ 5,804
Wilson	18	100	$ 4,554
Winkler	8	1,280	$ 375
Wise	23	67	$ 5,965
Wood	29	76	$ 2,457
Young	12	200	$ 1,705
Zapata	11	337	$ 2,300
Zavala	10	191	$ 3,598