

**2020 CANDIDATE CONSERVATION AGREEMENT WITH ASSURANCES FOR THE DUNES  
SAGEBRUSH LIZARD (*SCELOPORUS ARENICOLUS*) IN WEST TEXAS**

**DRAFT ENVIRONMENTAL ASSESSMENT**

Prepared for

**U.S. FISH AND WILDLIFE SERVICE**

10711 Burnet Road, Suite 200

Austin, Texas 78757

November 2020

Estimated Total Costs Associated with  
Developing and Producing this EA:

\$54,268

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## ABBREVIATIONS

Abbreviations	Description
2020 DSL CCAA	<i>Candidate Conservation Agreement with Assurance for the Dunes Sagebrush Lizard (Sceloporus arenicolus)</i>
af/y	acre-feet per year
Alternative A	Proposed Action: Issuance of section 10(A)(1)(A) Permit
Alternative B	No Action Alternative
Applicant	Canyon Environmental, LLC
CCAA	Candidate Conservation Agreement with Assurances
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Covered Activities	The type of activities authorized under the Proposed Action
Covered Area	The geographic extent of the Proposed Action
Covered Species	Species covered under the Proposed Action, i.e., the Dunes Sagebrush Lizard
CPA	Texas Comptroller of Public Accounts
DSL	Dunes Sagebrush Lizard
DSL Habitat	A geospatial model of potential habitat for the Covered Species that serves as the basis for the Covered Area
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
Proposed Action	Issuance of Section 10(a)(1)(A) Permit
PUF	Permanent University Fund
OHV	off-highway vehicles
ROW	Rights-of-way
Service	U.S. Fish and Wildlife Service
SHPO	State Historic Preservation Office
SWCA	SWCA Environmental Consultants
TASA	Texas Archeological Sites Atlas
TCEQ	Texas Commission on Environmental Quality
TCP	Texas Conservation Plan

Abbreviations	Description
TPWD	Texas Parks and Wildlife Department
USC	United States Code

# 1 PURPOSE AND NEED

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## 1.1 Introduction

This Draft Environmental Assessment (EA) has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) (42 USC 4321-4327) to evaluate potential impacts to the environment that may result from the *Candidate Conservation Agreement with Assurances for the Dunes Sagebrush Lizard (Sceloporus arenicolus)* (2020 DSL CCAA) submitted to the U.S. Fish and Wildlife Service (Service) by Canyon Environmental, LLC (Applicant). The species covered by the 2020 DSL CCAA (referred to as “Covered Species”) is the Dunes Sagebrush Lizard, *Sceloporus arenicolus* (DSL) in West Texas.

The proposed Federal action is the approval of the proposed 2020 DSL CCAA and issuance of the Enhancement of Survival Permit (Permit), pursuant to the Endangered Species Act of 1973, as amended (16 USC § 1531, *et seq.*) (ESA). The purpose of Candidate Conservation Agreements with Assurances (CCAA) is to encourage the public to voluntarily develop and implement conservation plans for species prior to them declining to the point of being listed under the ESA. The Service may issue the Permit if it finds that implementation of the CCAA is reasonably expected to provide a net conservation benefit to the species. (50 CFR 17.22(d)(2)(ii); 50 CFR 17.32(d)(2)(ii)). Non-Federal property owners that voluntarily enter into the CCAA and implement the CCAA’s specific conservation measures to reduce or eliminate threats to a covered species on their land would receive regulatory assurances from the Service that additional restrictions will not be required should the species be listed as “threatened” or “endangered” in the future (81 Fed. Reg. 95,171). Under Section 10(a)(1)(A) of the ESA, a Permit is issued for species that are candidates for federal listing under the ESA or other non-listed species; the Permit would only become effective if and when the covered species is actually listed as “threatened” or “endangered” under the ESA. The Permit would authorize take of the covered species incidental to activities covered by the CCAA and conservation measures implemented pursuant to the conservation plan in the CCAA.

The Applicant has submitted the 2020 DSL CCAA for approval and applied for a Permit pursuant to Section 10(a)(1)(A) of the ESA for the conservation of the DSL, or Covered Species, in Texas. If in the future the Covered Species is listed as “threatened” or “endangered” under the ESA, the Permit would become effective and authorize take of the Covered Species incidental to activities covered by the 2020 DSL CCAA (referred to as “Covered Activities”) (i.e., oil and gas development, sand mining, renewable energy, linear infrastructure, local government activities, and agriculture and ranching activities) and activities implemented pursuant to the conservation plan in the 2020 DSL CCAA. Participants enrolled in the 2020 DSL CCAA would also receive assurances through the Permit that, if the Covered Species is listed and they have fully implemented their commitments under the Permit and Certificates of Inclusion, they would not be required to undertake any additional conservation measures than those agreed to in the 2020 DSL CCAA, inclusive of changed circumstances. Even if new information indicates that additional or revised conservation measures are needed for the Covered Species, Participants would not be required to provide additional resource or land use restrictions (50 CFR 17.22(b)(5) and 17.32(b)(5)).

Approval of the 2020 DSL CCAA and issuance of a Permit under Section 10(a)(1)(A) of the ESA is a discretionary Federal action by the Service and is thus subject to NEPA. This EA was prepared pursuant to NEPA (42 USC 4321-4327), the Council on Environmental Quality (CEQ) NEPA implementing regulations (40 CFR Parts 1500-1508 (1978)) and the U.S. Department of the Interior’s supplemental NEPA implementing regulations (43 CFR Part 46). The purpose of the EA is to examine the types and intensity of impacts from implementation of the CCAA and issuance of the Permit to the Applicant for activities covered by the 2020 DSL CCAA (Alternative A – Proposed Action). This EA also evaluates a

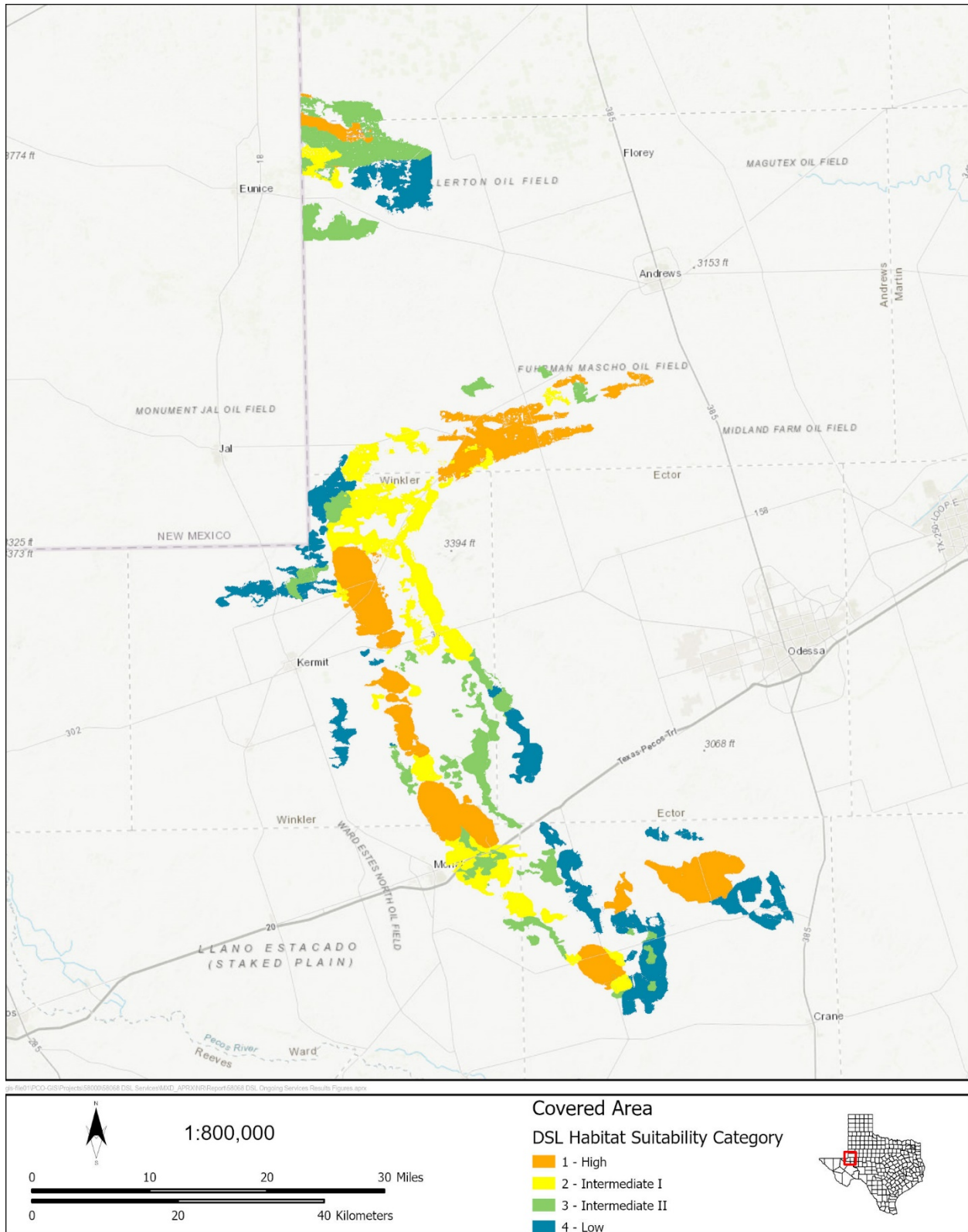
reasonable range of alternatives, including the No Action Alternative (Alternative B). If approved, the Applicant would implement the 2020 DSL CCAA.

## **1.2 2020 DSL CCAA Overview**

The purpose of the Service's CCAA program is to facilitate the conservation of species proposed for listing under the ESA and candidate species, and species that may become candidates or proposed for listing in the near future, by giving non-Federal property owners, such as individuals, States, local governments, Tribes, businesses, and organizations, incentives to implement conservation measures for declining species by providing regulatory assurances with regard to land, water, or resource use restrictions that might otherwise apply should the species later become listed as "endangered" or "threatened" under the ESA. (81 Fed. Reg. 95,171). The aim of the 2020 DSL CCAA is to allow Participants to voluntarily enroll to commit to conservation measures for the Covered Species (i.e., DSL) to reduce threats to the Covered Species from Covered Activities occurring on an Enrolled Property in modeled habitat for the Covered Species in West Texas (referred to as "DSL Habitat"), which represents the "Covered Area" of the 2020 DSL CCAA. The Covered Area spans portions of Andrews, Crane, Ector, Gaines, Ward, and Winkler Counties (Figure 1). Participants eligible to enroll in the 2020 DSL CCAA would include entities in the following sectors: oil and gas development, sand mining operations, renewable energy operations, linear infrastructure (including pipelines, transmission lines, and similar utilities) construction and operation, local government activities (including road construction and maintenance), and agriculture and ranching (collectively referred to as "Covered Activities"). Should the Covered Species become federally listed, Participants would receive regulatory assurances that the Service would not require the commitment of additional conservation measures or impose restrictions beyond agreements detailed in the 2020 DSL CCAA without consent of the permittee (or Applicant) and Participants (50 CFR 17.22(d)(5) and 17.32(d)(5)), should they have fully implement their commitments under the 2020 DSL CCAA.

The 2020 DSL CCAA describes conservation measures for the Covered Species in the Covered Area that are aimed to reduce current and reasonably foreseeable threats that are under the Participants' control and to reasonably likely result in a net conservation benefit to the Covered Species (81 Fed. Reg. 95,164). If the Service determines the conservation measures included in the 2020 DSL CCAA meet the Service's CCAA regulatory issuance criteria, a Permit may be, but is not required, to be issued. 50 CFR 17.22(d)(2)(ii) and 17.32(d)(2)(ii).





**Figure 1. Covered Area showing the categories and current locations of DSL Habitat suitability derived from Hardy *et al.* (2018) that establish the areas to which Conservation Measures of the 2020 DSL CCAA would be implemented.**

## **1.3 Purpose and Need for the Proposed Federal Action**

The purpose of the Proposed Federal Action is to

- approve the Applicant's 2020 DSL CCAA and issue a Permit for the Covered Species for activities covered in the 2020 DSL CCAA, pursuant to Section 10(a)(1)(A) of the ESA and its implementing regulations and policies;
- protect, conserve, and enhance the Covered Species, its habitat, and the ecosystem upon which it depends, and contribute to the long-term survival of the Covered Species through protection and management of the species and its habitat; and
- coordinate and provide technical assistance to the Applicant and Participants with the goal of providing a net conservation benefit to the Covered Species.

A CCAA is one conservation tool that may improve the status of a species such that listing becomes unnecessary; listing is as a "threatened" species instead of "endangered"; or the species' recovery is accelerated if it is listed. The Service would approve a CCAA if it determines that the conservation measures to be implemented would reduce and eliminate current and anticipated future threats that are under the property owner's control to the point that the conservation measures are likely to result in a net conservation benefit to the covered species such that its populations are stabilized, the number of individuals is increased, or habitat is improved.

The 2020 DSL CCAA is a voluntary program for the conservation of the DSL, the performance of which is not dependent on other DSL habitat conservation activities that may be undertaken through other CCAAs, such as the Texas Conservation Plan for the Dunes Sagebrush Lizard (TCP) (Service *et al.*) and the New Mexico DSL conservation programs, or programs sponsored by the Department of Agriculture's Natural Resource Conservation Service (NRCS). The 2020 DSL CCAA, however, is designed through its implementation to complement and enhance such other conservation programs. Specifically, the DSL would benefit from additional voluntary conservation measures on non-Federal lands in West Texas to reduce and eliminate threats that have emerged in the region since the original approval of the TCP. Accordingly, the 2020 DSL CCAA was developed to reduce these threats, for the benefit of the DSL.

## **1.4 Decision to be Made**

This Draft EA has been prepared to analyze the impacts on the quality of the environment and other potentially affected resources from implementation of the 2020 DSL CCAA and issuance of a Section 10(a)(1)(A) Permit to the Applicant for activities covered by the 2020 DSL CCAA. The Service must evaluate the 2020 DSL CCAA and Permit application to determine if they meet the Service's issuance criteria (50 CFR 13.21, 50 CFR 17.22(d)(2), 50 CFR 17.32(d)(2)). The Service must find that

- 1) the take would be incidental to an otherwise lawful activity and would be in accordance with the terms of the 2020 DSL CCAA;
- 2) the implementation of the terms of the 2020 DSL CCAA is reasonably expected to provide a net conservation benefit to the affected covered species by contributing to the conservation of the species included in the permit, and the 2020 DSL CCAA otherwise complies with the CCAA policy available from the Service;
- 3) the probable direct and indirect effect of any authorized take would not appreciably reduce the likelihood of survival and recovery in the wild of any species;

- 4) implementation of the terms of the 2020 DSL CCAA is consistent with applicable Federal, State, and Tribal laws and regulations;
- 5) implementation of the terms of the 2020 DSL CCAA would not be in conflict with any ongoing conservation programs for species covered by the permit; and
- 6) the applicant has shown capability for and commitment to implementing all the terms of the 2020 DSL CCAA.

If the Service determines the application is in conformance with the CCAA issuance criteria, the Service may approve the 2020 DSL CCAA and issue a Permit, which would become effective if the Covered Species is listed under the ESA.

## **1.5 Public Involvement**

On July 16, 2020, the Service published a Notice of Intent in the Federal Register informing the public that the Applicant submitted the 2020 DSL CCAA and a Permit application on June 17, 2020, and requested public input on the scope of this EA. Comments received in response to the Notice of Intent (NOI) have been considered in the preparation of this draft EA, which was made available for a 30-day public review and comment period. Comments received during that period were reviewed and considered in writing the draft EA.

### **1.5.1 Tribal Outreach**

Section 3.9 provides a discussion of cultural and historical resources in the Covered Area. On July 2, 2020, consistent with the requirements of Section 106 of the National Historic Preservation Act (NHPA), the Service notified 28 Federally recognized Tribes with potential interest in projects in the Covered Area of the Application and the 2020 DSL CCAA. The Service sent these notification letters to the following Federally recognized Tribes: Absentee-Shawnee Tribe of Indians of Oklahoma, Alabama-Quassarte Tribal Town, Alabama-Coushatta Tribe of Texas, Apache Tribe of Oklahoma, Caddo Nation of Oklahoma, Choctaw Nation of Oklahoma, Cherokee Nation of Oklahoma, Comanche Nation of Oklahoma, Coushatta Tribe of Louisiana, Delaware Nation, Fort Sill Apache Tribe of Oklahoma, Jicarilla Apache Nation, Kialagee Tribal Town, Kickapoo Traditional Tribe of Texas, Kickapoo Tribe of Oklahoma, Kiowa Indian Tribe of Oklahoma, Mescalero Apache Tribe, Muscogee (Creek) Nation of Oklahoma, Osage Nation, Poarch Band of Creek Indians, Quapaw Tribe of Oklahoma, Seminole Nation of Oklahoma, Thlopthlocco Tribal Town, Tonkawa Tribe of Oklahoma, Tunica-Biloxi Tribe of Louisiana, United Keetoowah Band of Cherokee Indians, Wichita and Affiliated Tribes, and Ysleta del Sur Pueblo. On September 25, 2020, additional letters were sent to Sandia Pueblo and Ysleta Pueblo.

As of November 6, 2020, three Tribes have responded to the notification letters, including the Ysleta del Sur Pueblo, the Sandia Pueblo, and the United Keetowah Band of Cherokee. The Ysleta del Sur Pueblo in New Mexico responded that the Tribe has an interest in the Covered Area and the DSL and wished to continue consultation. The United Keetowah Band of Cherokee in Oklahoma also responded, indicating that the Covered Area is outside of their historic area of interest and that the Tribe requires no further consultation on the application and 2020 DSL CCAA.

## 2 DESCRIPTION OF ALTERNATIVES

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This chapter describes the alternatives considered in this EA (Alternative A —Proposed Action and Alternative B — No Action), as well as alternatives that were considered but eliminated from detailed analysis.

### 2.1 **Alternative A – Issuance of a Section 10(a)(1)(A) Permit for Activities Covered and Implementation of the 2020 DSL CCAA (Proposed Action)**

Under Alternative A, the Service would approve implementation of the 2020 DSL CCAA and issue a Section 10(a)(1)(A) Permit to the Applicant for activities covered in the 2020 DSL CCAA for up to 23-year. The Permit would require the implementation of the conservation measures and actions described in the 2020 DSL CCAA. The Administrator of the 2020 DSL CCAA and Participants must implement the conservation measures set forth in the 2020 DSL CCAA for Covered Activities to reduce or eliminate threats to the Covered Species (i.e., DSL) and improve its status (81 Fed. Reg. 91,564; 50 CFR 17.22(d) and 50 CFR 17.32(d)). Implementation of the 2020 DSL CCAA would include conservation measures aimed at avoiding or minimizing disturbance in and actions to protect and restore priority habitat for the Covered Species. These conservation measures and actions, which are summarized in Section 2.1.4, are designed to result in a net conservation benefit to the Covered Species, including to reduce and eliminate threats to the DSL by avoiding, minimizing, and mitigating potential impacts associated with Covered Activities.

The Permit would require the implementation of the measures described in the 2020 DSL CCAA. In the event that the Covered Species becomes listed as “threatened” or “endangered” under the ESA, the Permit would become effective and would authorize the incidental take of the Covered Species for Covered Activities by Participants consistent with the terms of the 2020 DSL CCAA. The 2020 DSL CCAA uses acres of disturbance or loss of potential DSL Habitat as a proxy for take in the Covered Area, estimating the maximum amount of anticipated incidental take to be 34,940 acres. Actual levels of incidental take authorized under the Permit would depend on the levels of activity by Participants on Enrolled Property, although the maximum amount of incidental take of DSL habitat would not exceed 34,940 acres during the term of the Permit subject to the requirements of the 2020 DSL CCAA, including annual and total disturbance caps applicable to sand mining Participants. The Permit may be renewed through application and in accordance with applicable permit renewal regulations (50 CFR 13.22), unless it is suspended or revoked by the Service, as provided in its permitting regulations (50 CFR 17.22(d) and 50 CFR 17.32(d)).

Under Alternative A, the Permit would be issued to the Applicant. The CCAA includes a Certificate of Inclusion provision that would allow the Administrator of the 2020 DSL CCAA to enroll Participants by creating a contract between the Administrator and the Participant. Non-Federal property owners who are not Participants in the 2020 DSL CCAA or another conservation agreement (e.g., TCP) that would be interested in engaging in voluntary conservation measures for the Covered Species in the Covered Area in return for regulatory assurances would need to pursue separate CCAAs with the Service. If the species is listed under the ESA, no further enrollment by new Participants in the 2020 DSL CCAA could occur.

#### 2.1.1 **Covered Species**

The Covered Species in the 2020 DSL CCAA is the DSL, a small, brown lizard with a maximum body length of 2.9 inches for males and 2.5 inches for females (Fitzgerald *et al.* 2011). The Covered Species is

endemic to the ecosystems of the Mescalero Sands of New Mexico and Monahans Sandhills of Texas, the latter of which occurs in the Covered Area (Axtell 1988; Degenhardt and Jones 1972; Fitzgerald *et al.* 1997). The Covered Species is a habitat specialist of shinnery oak (*Quercus havardii*) sand dunes with blowouts (i.e., depressions that have been hollowed out by wind), or shinnery oak hummocks (i.e., aboveground knolls or mounds) that may or may not be interspersed with honey mesquite (*Prosopis glandulosa*) hummocks (Degenhardt and Jones 1972; Fitzgerald *et al.* 1997; Fitzgerald *et al.* 2011; Johnson *et al.* 2016; Sena 1985; Walkup *et al.* 2018). Within Texas, the Covered Species historically occurred in Andrews, Crane, Gaines, Ward, and Winkler Counties, but recent detections of the Covered Species in Texas have been limited to Andrews, Gaines, Ward, and Winkler Counties (Axtell 1988; Degenhardt and Jones 1972; Laurencio *et al.* 2007; Painter and Sias 1998; Fitzgerald *et al.* 2011; Walkup *et al.* 2018).

### **2.1.2 Covered Area**

The Covered Area in the 2020 DSL CCAA is modeled potential habitat for the Covered Species in the Texas portion of its range, which spans portions of Andrews, Crane, Ector, Gaines, Ward, and Winkler Counties (*see* Figure 1). Non-Federal properties within the Covered Area are eligible to be enrolled by Participants in the 2020 DSL CCAA. Modeled potential habitat for the Covered Species is based on a geospatial model developed at Texas State University (Hardy *et al.* 2018). This Texas State University model attempts to map the Covered Species' habitat (e.g., shinnery oak dune structures and shinnery oak flats) and broadly classifies the landscape into habitat suitability categories for the Covered Species including High, Intermediate I and II (collectively Intermediate), or Low Suitability categories (Hardy *et al.* 2018). As an approximation of the Covered Species' habitat over a large scale, the Texas State University model is a working model that evolves with on-site habitat assessments and surveys. Mapped polygon locations, extents and associated acreages are refined with additional data resulting in new versions of the model. The current Texas State University model, encompassing approximately 287,327 acres, serves as the geographic location of potentially suitable DSL Habitat in Texas and therefore represents the Covered Area for the 2020 DSL CCAA.

### **2.1.3 Covered Activities**

The Applicant would enroll Participants in the 2020 DSL CCAA. Participant activities on enrolled property related to the Covered Activities also include activities associated with conservation, research, and monitoring performed or approved under the 2020 DSL CCAA. Key aspects of the Covered Activities and conservation, research, and monitoring under the 2020 DSL CCAA are summarized in Table 1. Additional information on these Covered Activities is provided in Chapter 6 of the 2020 DSL CCAA.

**Table 1. 2020 DSL CCAA Covered Activities**

<b>Activity</b>	<b>Description</b>
Oil and gas development	Equipment and activities related to seismic and land surveys; construction, operation, and/or maintenance of oil and gas facilities and associated activities including access roads; well sites; wells; flowlines, pipelines, and utilities; compressor facilities and/or gathering/processing facilities; in-field electrical distribution systems; plugging and abandonment; emergency operations; drilling, completion, recompletion, and workover; well site fencing; routine production, operation, and maintenance; and remediation and reclamation.
Sand mining	Excavation and processing of sand; access roads, processing plants, and other infrastructure; and drilling of water wells.
Renewable energy operations	Construction and maintenance of power lines, access roads and appurtenant structures (in Low Suitability areas of Covered Species habitat only).
Linear infrastructure construction and operation	Construction, operation, repairs, and maintenance of industrial pipelines, transmission and distribution lines, similar utilities, access roads, and appurtenant structures (e.g., pipe yards, interconnects, compressor stations, substations)
Agriculture and ranching	Agriculture and ranching activities involving brush management; livestock grazing; construction and maintenance of fences, access roads, water storage, and water transmission facilities; farming; and irrigation.
General construction activities	General construction activities associated with the enrollment sectors including but not limited to the construction of facility sites, associated infrastructure, and access roads; and implementation of best management practices.
Conservation, research, and monitoring	Activities associated with conservation, research, and monitoring projects including Covered Species surveys; refinement of models of potential habitat; captive breeding and reintroduction; temporal, spatial, and geomorphological dynamics of dune systems and stability; relationships between water use, hydrogeology, and dune systems; and other similar activities to study, monitor, and assess the species and the efficacy of and compliance with the 2020 DSL CCAA.

### **2.1.4 Conservation Measures**

The biological goal of the 2020 DSL CCAA is to achieve a net conservation benefit for the Covered Species through reduction or elimination of threats to the Covered Species on Enrolled Property. The 2020 DSL CCAA aims to achieve this goal through the following objectives:

- Develop a conservation strategy financially supported through a fee structure to acquire conservation easements and other protections, and to implement other conservation actions.
- Enrollment of Participants in the 2020 DSL CCAA and the payment of fees by Participants including stratified mineral rights holders<sup>1</sup>.
- Avoid, minimize, or offset impacts from Covered Activities in the portions of the Covered Area categorized as High or Intermediate Suitability, or in areas with demonstrated potential to affect the abundance, habitat suitability, or habitat connectivity of the Covered Species.
- Preserve and/or restore high priority areas of DSL Habitat.
- Implement research and evaluation of conservation measures and conservation actions of the 2020 DSL CCAA.

To meet the goal and objectives, the 2020 DSL CCAA proposes conservation measures for the Covered Species. These conservation measures are described in detail in the 2020 DSL CCAA and include the following types of measures:

<sup>1</sup> Mineral rights may be held by a different Participant or Participants than surface rights, in which case, they are referred to as stratified mineral interests.

- Avoid or limit surface development and surface use in High or Intermediate Suitability Areas of DSL Habitat; utilize existing developed areas and infrastructure to the extent possible and practicable; and minimize infrastructure footprints.
- Support collaboration between severed surface and mineral lease holders to develop approaches to minimize surface disturbance and implement planned development that conforms with the requirements of the CCAA.
- Develop and implement plans and measures to minimize and/or control habitat fragmentation, groundwater use, dust, traffic, and spills.
- Monitor disturbed areas (e.g., dunes) to identify areas where re-grading is necessary.
- Monitor infrastructure (e.g., pipelines) to identify sources of potential contamination.
- Restore disturbed areas through re-grading and revegetation.
- Implement best management practices, such as barrier fencing, to protect DSL Habitat and individual DSL.
- Physically inspect trenched areas to remove and relocate trapped DSL and provide escape ramps.
- Implement site-specific habitat assessments and presence/absence surveys for Enrolled Property that would be mined.
- Implement mitigation or offsets for impacts on specific areas of potential DSL Habitat.
- Comply with applicable livestock stocking rates or equivalent grazing management system in High or Intermediate Suitability Areas of DSL Habitat.
- Avoid the establishment or introduction of exotic, invasive species; avoid sprayed applications of herbicides for weed control; and restrict the use of herbicides in specific DSL Habitat.

## 2.1.5 *Anticipated Incidental Take*

The 2020 DSL CCAA estimates the maximum amount and extent of anticipated take of the DSL that could occur using the area of disturbance or loss of potential DSL Habitat from Covered Activities as a proxy for incidental take of the Covered Species. Table 2 summarizes the estimated maximum amount of disturbance of potential DSL Habitat regardless of suitability classification under the Hardy model, as a proxy for take, that may occur from Covered Activities in the Covered Area associated with each Enrollment Sector inclusive of Participants in the 2020 DSL CCAA and non-Participants engaging in similar activities in the Covered Area for the duration of the 2020 DSL CCAA . If maximum estimated take occurred, disturbance of DSL Habitat from all Covered Activities would account for approximately 12% (34,940 acres) of the potential DSL Habitat in the Covered Area (287,327 acres).

**Table 2. Maximum Anticipated Take Associated With Covered Activities for Each Enrolled Sector**

Enrolled Sector	Acreage*	Percent of Covered Area
Oil and Gas Development	15,424	5.4
Sand Mining	16,560	5.8
Renewable Energy Operations	767	0.3
Linear Infrastructure Construction and Operation	1,355	0.4

Enrolled Sector	Acreage*	Percent of Covered Area
Local Government, Agriculture and Ranching	834	0.3
<b>Total</b>	<b>34,940</b>	<b>12.1</b>

\*Estimated acreage is an estimated total potential future disturbance for Participants of the 2020 DSL CCAA and non-Participants conducting similar activities across the Covered Area over the duration of the 2020 DSL CCAA (see Section 18.2 and 18.3 of the 2020 DSL CCAA for more details).

Overall, the participation of entities engaged in Covered Activities, in particular sand mining, in voluntary conservation pursuant to the 2020 DSL CCAA is expected to substantially reduce disturbance of DSL Habitat relative to the current baseline of activities currently ongoing. The current baseline, as reflected by the No Action Alternative, is marked by the absence of Federal regulatory and land management authority to conserve and protect an unlisted species and its habitat on private property in West Texas. In addition to providing firm annual and total caps that limit disturbance of DSL Habitat, by allowing all sand mining operations to participate in the 2020 DSL CCAA, including those located in High and Intermediate Suitability Habitat as described under the Texas State University model, all reasonably foreseeable activities are taken into account and would be subject to conservation measures including (1) Habitat Conservation Fees and other fees to incentivize avoidance of and conservation of High Priority Areas, reduce fragmentation of DSL Habitat, and fund DSL and DSL Habitat conservation and scientific research; (2) offsets to habitat disturbance and fragmentation through conservation of DSL Habitat through Conservation Easements and other protections; (3) sector-specific suites of best management practices and other protective measures; and (4) an Adaptive Management process.

## 2.2 Alternative B – No Action

Under the No Action Alternative, the 2020 DSL CCAA would not be implemented, and the Service would not issue a Section 10(a)(1)(A) Permit to the Applicant for activities covered in the 2020 DSL CCAA. Activities resulting in the disturbance of DSL Habitat are ongoing and would continue on private property across the Covered Area without being subject to the Conservation Measures required under the 2020 DSL CCAA. This includes ongoing commercial, industrial and other activities such as oil and gas development and sand mining in DSL habitat, which generally do not require approvals from the Service or other Federal agencies to be conducted on private property in West Texas. Because there is no “close causal relationship” between the proposed action and these activities, which do not require the Service’s approval, impacts associated with the underlying effects of these activities are not direct or indirect effects of the proposed action or consequences of the proposed action. *See, e.g., Dep’t of Transportation v. Public Citizen*, 541 US 752, 767 (2004).

The Covered Species is not federally listed and thus the regulatory protections under the ESA would not apply to any activities. The private property comprising virtually all of the Covered Area would also not be subject to management for conservation of the Covered Species under the CCAA. Under the No Action Alternative, private property owners could engage in conservation management activities aimed to benefit the Covered Species individually at their discretion, but any actions taken would not be provided regulatory assurances. As a result, there would be no incentives to encourage conservation activities, and the activities would not be part of an integrated conservation strategy for the benefit of the Covered Species.

Should the Covered Species become listed under the ESA in the future, activities that result in take of the Covered Species could be in violation of regulatory protections under the ESA. To comply with the ESA, persons engaged in these activities could modify their activities to avoid take or seek authorization from



the Service for take incidental to otherwise lawful activities. Such authorization could occur on a project-by-project basis or through a programmatic action. The project-by-project compliance approach could result in uncoordinated conservation measures that would not be as productive or beneficial for the Covered Species.

Under the No Action Alternative, the existing TCP (Service *et al.* 2011) would continue to operate. The Covered Area of the 2020 DSL CCAA overlaps with the existing TCP covered area and includes activities associated with oil and gas and agriculture and ranching but did not establish specific conservation measures for sand mining and renewable energy operations. However, enrollment of in the TCP by sand mining and renewable energy operations have been enrolled, and conservation measures agreed to that are consistent with the TCP. This has been done to promote voluntary conservation measures prior to a potential future listing.

## **2.3 Alternatives Eliminated from Further Analysis**

NEPA regulations (40 CFR 1502.14(c)) require consideration of reasonable alternatives, which must be practical and technically and economically feasible. As a result, the Service considered three additional alternatives, as described below.

First, the Texas Comptroller of Public Accounts (CPA) developed a draft CCAA (hereafter referred to as the CPA CCAA) in consultation with the Service (CPA 2020a). The CPA CCAA expanded covered activities to a broader list of industries beyond those included in the TCP. The CPA CCAA specifically would cover activities implemented by sand mining operations, renewable energy operations, and pipeline construction and operation. This CCAA was still under internal review and negotiations. The calculations of take were overestimated due to miscalculation. Prior to the finalization and ability to put it out for public review, the applicant withdrew its application. This alternative is no longer a reasonable alternative to the Proposed Action as the CPA withdrew their application and was not carried forward for further analysis.

Another alternative considered was the amendment to the original TCP to incorporate the new science on the species and the new potential participants within the covered area. The permit holder for the TCP as transferred was not ready to amend their CCAA.

## 3 AFFECTED ENVIRONMENT

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### 3.1 Introduction

The affected environment describes the current environmental conditions for resources within the Covered Area. Detailed discussion of resources is restricted to those that would be affected by the Proposed Action, as described in Section 3.1.1. Resources that were dismissed from detailed analysis are addressed in Section 3.1.2.

#### 3.1.1 *Resources Analyzed in this Environmental Assessment*

The Service reviewed all human environment<sup>2</sup> resources to determine which resources could be affected by the Proposed Action and should be carried forward in this EA for further detailed analysis. In accordance with CEQ NEPA guidance, this EA is “analytic rather than encyclopedic,” discusses impacts proportionally to their significance, and only briefly discusses impacts that are not significant (40 CFR 1502.2(a)-(b)). The resources identified with the potential to have greater impacts from the Proposed Action, either adversely or beneficially, are described in greater detail later in this section and analyzed in detail in Section 4.

#### 3.1.2 *Resources Not Considered for Detailed Analysis*

Table 3 lists the resources that have not been carried forward for further analysis in this EA and includes a brief explanation why each resource listed has not been carried forward for further review. Because the Service has no regulatory authority over the activities covered by the 2020 DSL CCAA and because these activities can proceed in the Covered Area without a Permit, this analysis focuses only on the potential impacts that would occur relevant to (1) the Proposed Action (i.e., implementation of conservation measures for activities covered in the 2020 DSL CCAA and issuance of a Permit to the Applicant), and (2) the No Action Alternative (i.e., rejection of the Applicant’s Permit application and no implementation of conservation measures for activities covered in the 2020 DSL CCAA).

**Table 3. Resources Dismissed from Analysis**

Resource	Rationale
Air Quality	Issuance of a Permit for activities covered in the 2020 DSL CCAA or implementation of conservation measures of the 2020 DSL CCAA would not alter ongoing or future air quality within the Covered Area.
Noise	Issuance of a Permit for activities covered in the 2020 DSL CCAA or implementation of conservation measures of the 2020 DSL CCAA would not result in changes to ambient noise conditions.
Aesthetics and Visual Resources	Issuance of a Permit for activities covered in the 2020 DSL CCAA or implementation of conservation measures of the 2020 DSL CCAA would not result in degradation of public views or scenery.
Recreation	Issuance of a Permit for activities covered in the 2020 DSL CCAA or implementation of conservation measures of the 2020 DSL CCAA would restrict access to or the use of recreation resources.
Transportation	Issuance of a Permit for activities covered in the 2020 DSL CCAA or implementation of conservation measures of the 2020 DSL CCAA would not result in changes to existing transportation resources or reduce the level of service of roadways or intersections.

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<sup>2</sup> The human environment is defined by CEQ as the natural and physical environment, and the relationship of people with that environment (40 CFR 1508.14).

Resource	Rationale
Socioeconomics and Environmental Justice	<p>Issuance of a Permit for activities covered in the 2020 DSL CCAA or implementation of conservation measures of the 2020 DSL CCAA would neither generate or adversely affect employment, income, or spending that would contribute to the local economy.</p> <p>The decision to become a Participant in the 2020 DSL CCAA is at the discretion of the landowner, and the implementation of conservation measures in the 2020 DSL CCAA would be limited to Enrolled Property. As a result, changes to resources would generally be limited to the Enrolled Property. The Covered Area, and therefore Enrolled Property, is predominantly rural, with populations generally concentrated around towns. Covered Activities or associated impacts would generally not occur near population centers. In cases where changes to resources would occur to a widespread area (e.g., Covered Area, landscape unit, etc.), changes would not be disproportionately experienced by any one population.</p>

## 3.2 Covered Species

The Covered Species occurs in the Mescalero-Monahans Shinnery Dune System of New Mexico and Texas (Axtell 1988; Degenhardt and Jones 1972; Fitzgerald *et al.* 1997). The Covered Species' range is predominantly in New Mexico, where the extent of the Covered Species range is 1,447,137 acres, with an estimated 397,424 acres of modeled habitat (Johnson *et al.* 2016). In Texas, the extent of the Covered Species' range is 459,102 acres (Johnson *et al.* 2016; Texas A&M University 2016), with an estimated 287,327 acres of modeled habitat based on the Texas State University model (Hardy *et al.* 2018), which represents the Covered Area.

The Covered Area consists of shinnery oak sand dunes, shinnery oak shrublands, and shinnery oak hummocks cover types that may be interspersed with honey mesquite hummocks (Degenhardt and Jones 1972; Fitzgerald *et al.* 1997; Fitzgerald *et al.* 2005; Fitzgerald *et al.* 2011; Johnson *et al.* 2016; Sena 1985; Walkup *et al.* 2018). The Covered Species nests, forages, and shelters in shinnery oak sand dunes and shinnery oak hummocks, and may use shinnery oak shrublands for dispersing (Degenhardt and Jones 1972; Fitzgerald *et al.* 2005; Hill and Fitzgerald 2007; Ryberg and Fitzgerald 2015; Sena 1985; Walkup *et al.* 2018). These cover types are characteristic of semi-arid conditions in the Covered Area and are further described in Section 3.4, Vegetation. The Covered Area has been mapped and categorized into classes of habitat suitability for the Covered Species as defined in Hardy *et al.* (2018) that serve as general approximations of areas that may be used by the Covered Species for breeding, feeding, sheltering, or dispersing.

The Covered Species is difficult to detect and patchily distributed within suitable habitat across its range (Fitzgerald *et al.* 1997; Fitzgerald *et al.* 2011; Johnson *et al.* 2016; Laurencio *et al.* 2007; Smolensky and Fitzgerald 2010; Walkup *et al.* 2018; Walkup *et al.* 2019). Estimates of population size and trends are lacking for most of the Covered Species' range. In Texas, it is estimated that 99% of the Covered Species' range is on private land with access restrictions to conduct population surveys, compared to New Mexico, where it is estimated that 76% of the Covered Species' range is on Federal or State owned or leased lands (Fitzgerald *et al.* 2011; Hardy *et al.* 2018; Johnson *et al.* 2016). Based on the current available scientific and commercial information on the correlation between the Covered Species' occupancy and population parameters and suitable habitat (Ryberg *et al.* 2013, 2015; Snell *et al.* 1997; Walkup *et al.* 2017; Walkup *et al.* 2018; Walkup *et al.* 2019), the status of the Covered Species has largely been inferred from the status of potentially suitable habitat (Center for Biological Diversity and Defenders of Wildlife 2018; Forstner *et al.* 2018; New Mexico Department of Game and Fish 2018; 77 Fed. Reg. 36,872).

Primary threats to the Covered Species have included suitable habitat loss, modification, degradation, and fragmentation (New Mexico Department of Game and Fish 2018; 77 Fed. Reg. 36,872) from energy

development activities and agricultural and ranching activities. Secondary threats include predation, exposure to pollutants from oil and gas activities and climate change (77 Fed. Reg. 36,872). Energy development activities physically remove shinnery oak and sand dunes or degrade habitat. Removal of shinnery oak whether by mechanical or chemical measures may alter the shinnery oak vegetation community and geomorphology of the sand dunes that in turn affects local abundances of the Covered Species (Davis 2013; Peterson and Boyd 1998; Ryberg *et al.* 2015; Snell *et al.* 1997), it is anticipated that the impacts of sand mining further impact the geomorphology of the sand dunes and vegetative structure that stabilize dunes through the removal of substrate and creation of pits that will accumulate and disrupt the geomorphology of dune formation. Some studies indicate that relative abundance and relative occurrence of the Covered Species are lower in proximity to high densities (i.e., > 13 oil well pads/mi<sup>2</sup>) of development (Johnson *et al.* 2016; Sias and Snell 1998). Development of infrastructure, ancillary facilities, and access roads may fragment habitat based on studies indicating that roads may act as semi-permeable barriers to movement of the Covered Species (Hibbitts *et al.* 2013; Young *et al.* 2018). Heavy machinery associated with various development activities for seismic exploration, excavation, trenching, or construction, and off-highway vehicles (OHV) may kill the Covered Species if used in habitat where individuals or nests are present. Concerns of indirect threats to habitat from groundwater use by sand mining facilities were raised in a 2018 petition to list the Covered Species under the ESA (Center for Biological Diversity and Defenders of Wildlife 2018). Additional details on threats of the Covered Species may be found in the Service's withdrawal of the proposed rule to list the Covered Species (77 Fed. Reg. 36,872) and the 2020 DSL CCAA.

Recent studies have delineated patterns of genetic differentiation of the DSL across its range (Chan *et al.* 2009; Chan *et al.* 2014, Chan *et al.* 2020). The summary of these studies, based on mitochondrial DNA, present a geographic distribution of 10 different phylogroups suggesting limited migration (Chan *et al.* 2020). These groups are composed of 7 Mescalero Sands units, including Gaines County and northern Andrews County in Texas, and 3 Monahans Sandhills groups<sup>3</sup>. These phylogroups reflect historical population differentiation based on reduced connectivity that first occurred thousands of years ago and are early divergences that have persisted to present day (Chan *et al.* 2020). This study also found that DSL colonized the northern Mescalero Sands over 34,000 years ago and then divergence between the Mescalero Sands and the Monahans Sandhills phylogroups occurred at least 16,000 years ago.

In Texas, Chan *et al.* (2020) found four phylogeographic groups: 1) Gaines County and northern Andrews County, which are part of the southern Mescalero Sands group; 2) southern Andrews County; 3) the northern two-thirds of Winkler County; and 4) southern Winkler and northern Ward counties. Because of the lack of DSL specimens, habitat in southern Ward County and all of Crane County did not get assigned to a group (see Figure 1 in Chan *et al.* 2020). Divergences detected amongst phylogroups indicate that extensive habitat may be necessary to support gene flow among and between the phylogroups, including dispersal corridors (Chan *et al.* 2020). Additionally, continued fragmentation increases the likelihood diversity within populations will decrease and evolutionary lineages may be lost (Chan *et al.* 2020).

Existing conservation plans including the TCP (Service *et al.* 2011) and the *Candidate Conservation Agreement for the Lesser Prairie-Chicken (Tympanuchus pallidicinctus) and Sand Dune Lizard (Sceloporus arenicolus)* (Service *et al.* 2008) aim to address the potential threats to the Covered Species in Texas and New Mexico, respectively.

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<sup>3</sup> The southern portion of mapped DSL habitat (southern Ward County and Crane County) is not assigned to a group because there is no genetic material.

### 3.3 Hydrology and Water Resources

Surface water is limited within the Covered Area, with lands containing very low drainage density and no named perennial creeks (Griffith *et al.* 2007). Precipitation is highly variable annually and the region is susceptible and adapted to drought conditions (Machenberg 1984; Muhs and Holliday 1995; Peterson and Boyd 1998). Precipitation is captured in seasonal intermittent pools and playas that provide water for wildlife and vegetation (Machenberg 1984; Peterson and Boyd 1998). Precipitation also recharges near-surface groundwater, which may act as a stabilizer of sand dunes directly or indirectly through growth of stabilizing vegetation (Machenberg 1984; Muhs and Holliday 1995). The semiarid climate of this region contributes to groundwater fluctuations, which result in rapid shifts in the natural landscape (Muhs and Holliday 1995).

Given the limited surface water available, groundwater from aquifers is the primary water source for all activities in the Covered Area. Three major and four minor aquifer systems underlie the Covered Area, consisting of the Edwards-Trinity (Plateau), Ogallala, and Pecos Valley major aquifers and the Capitan Reef Complex, Dockum, Edwards-Trinity (High Plains), and Rustler minor aquifers (Griffith *et al.* 2007). The Pecos Valley and Dockum Aquifers underlie most of the Covered Area and the Ogallala Aquifer underlies a minor northern portion of the Covered Area in Andrews and Gaines Counties (Figure 3.1 in Mace 2019); these three aquifers are therefore the focus of this analysis of hydrology and water resources. The Covered Area also contains localized perched aquifers situated within but above the regional aforementioned aquifers (Machenberg 1984). Perched aquifers are formed where a semi-impermeable layer such as caliche prevents water from percolating into deeper sediments and underlying aquifers creating localized accumulation of water and ponding (Machenberg 1984). The depth and volume of the perched aquifer is determined by the shape and size of the semi-impermeable layer, and climate conditions which are highly variable in this region and thus provide a limited and unpredictable supply of water (Arthur *et al.* 2020). Ponded water from these perched aquifers may be ephemeral, evaporating with cessation of precipitation, and become enveloped by shifting sand dunes (Machenberg 1984). Because of the separation of groundwater between a perched aquifer and the underlying aquifer by the semi-impermeable layer, groundwater uses of the underlying aquifer will not affect groundwater in the perched aquifer (Mace 2019).

The Ogallala Aquifer underlies all of Gaines County, and portions of Andrews, Ector and Winkler Counties. Most of the groundwater use in Gaines County is for irrigation. Groundwater from the Ogallala Aquifer is used to lesser extent in Andrews and Ector Counties.

The Pecos Valley Aquifer is an unconfined aquifer (i.e., not confined by an overlying impermeable stratum but is in direct contact and subject to fluctuation of the water table), which underlies all of Ward County, and portions of Crane, Winkler, Andrews and Ector Counties. Recharge of the aquifer is primarily through precipitation and irrigation return flow (Ashworth 1990). Most of the groundwater used in Crane and Ward Counties is supplied by the Pecos Valley Aquifer and is primarily used for municipal purposes and for irrigation. In Ward County, declines in water levels in the Pecos Valley Aquifer have been attributed to increased use by municipal and industrial pumping whereas increases in water levels have been attributed to declines in irrigation. Water quality ranges from fresh to slightly saline and may be affected by runoff from surface waters, agricultural, oil field brines, and cross-formational flow from underlying saline aquifers induced by pumping.

The Dockum Aquifer is a minor aquifer underlying almost all of Andrews, Ector, and Winkler Counties and portions of Crane, Gaines, and Ward Counties. The Dockum Aquifer is a confined aquifer (i.e., contains impermeable strata above and below and recharge occurs wherever there is a connection to an

unconfined aquifer or where permeability of the overlying stratum increases to allow water flow) that sits below the Pecos Valley Aquifer. The Dockum Aquifer is primarily recharged via precipitation where there is direct connection to the land surface or indirectly from precipitation through the infiltration into the soil (Bradley and Kalaswad 2003). Available groundwater data indicate the primary use of the aquifer is for municipal purposes in Winkler County. Water quality ranges from fresh to brine. In the Dockum Aquifer, total dissolved solids (TDS) concentrations increase with depth, indicating degraded waters in the deeper parts of the aquifer (Bradley and Kalaswad 2003). Naturally occurring minerals and other constituents, including radon, uranium, chloride, and fluoride, exceed acceptable drinking water standards throughout portions of the aquifer (Texas Water Development Board [TWDB] 2020a).

Perched aquifers may occur above the Ogallala, Pecos and Dockum Aquifers wherever there is a caliche layer that inhibits the percolation of groundwater into the deeper sediments. These shallow aquifers may provide a source of water for construction activities but activities involving groundwater pumping from wells would draw from deeper underlying aquifers. Groundwater in the Covered Area is also used by the energy development sectors including the oil and gas, sand mining, renewable energy and linear infrastructure construction and operation. Groundwater use data for the Pecos Valley Aquifer and Dockum Aquifer predate development of the sand mining industry and renewable energy sectors. Mace (2019) extrapolates estimates of groundwater use for oil and gas operations and sand mining based on typical or standard operations and their water needs. For the sand mining industry, groundwater may be used for mining and transport, sand processing, dust control, and on-site potable needs. Based on approximations, Mace (2019) estimates that sand mining facilities in the Covered Area pump between 10,000 and 40,000 acre-feet annually. Mace (2019) also estimates that between 42,900 acre-feet and 77,000 acre-feet could be pumped per year from underlying aquifers across Crane, Ector, Ward and Winkler Counties based on assumptions of levels of drilling intensity, drilling methods (i.e., conventional or non-conventional), water needs, etc. Oil and gas operators utilize regional groundwater from the Pecos Valley and Dockum Aquifers for conventional drilling and unconventional hydraulic fracturing of wells. Oil and gas development activities accounted for an estimated 3% of the total water use in the Permian Basin in 2014, which was estimated to increase regionally since then (Mace 2019). The range of estimated water use by oil and gas operations and the sand mining sectors fall within the reported water use by municipalities and for irrigation across the counties of the Covered Area (Mace 2019).

As stated above, there are very few surface waters in the Covered Area, thus the hydrology of the ecosystem within the Covered Area is subject to highly variable annual precipitation and concomitant fluctuations groundwater (Machenberg 1984; Muhs and Holliday 1995; Peterson and Boyd 1998). The soils, landforms, and vegetation of the Covered Area are adapted to groundwater fluctuations (Machenberg 1984; Muhs and Holliday 1995; Peterson and Boyd 1998).

Fluctuations in groundwater levels are caused by a combination of climate, recharge and pumping for water supply, and other factors. Use of groundwater from multiple aquifers (e.g., perched aquifers, the confined Dockum Aquifer, and the unconfined Pecos Aquifer) would involve groundwater from perched and regional aquifers each subject to specific water-level fluctuations. Of the available long-term water well data of the Pecos Valley Aquifer in the Covered Area, Mace (2019) found slight declines to rises in water levels over the last 70 years. In other parts of the Pecos Valley Aquifer outside of the Covered Area there are regional increases and decreases (TWDB 2020b). Projected water-level trends from groundwater modeling are difficult to predict due to natural dynamics of the aquifers, aberrant dynamics associated with climate change, and various uses of groundwater. This is exemplified in the variability in projections (e.g., 5-foot to 4,000-foot decline over 10 years) for the Pecos Valley Aquifer associated with a single frac sand mine example (Mace 2019). Consequently, water-levels of these aquifers are anticipated to

fluctuate over the long-term with changes in the patterns of pumping, discharge and recharge (Anaya *et al.* 2016).

Water rights are held by the landowners and are regulated under the Texas Water Code. The Llano Estacado Underground Water Conservation District manages the use of the Ogallala Aquifer in Gaines County. There are no groundwater conservation districts that manage groundwater in the Pecos Valley or Dockum Aquifer within the Covered Area. Groundwater use in areas not managed by a conservation district are subject to the Rule of Capture, which allows land surface owners to pump the water beneath their property and from beneath other properties as long as there is no waste or the water is not withdrawn for malicious purposes (Houston & Texas Central Railway Co. 1904).

### **3.4 Soils**

The Mescalero-Monahans Shinnery Dune System is an eolian sand dune system patchily distributed in Chaves, Eddy, Lea, and Roosevelt Counties in New Mexico, and Andrews, Gaines, Crane, Ector, Ward, and Winkler Counties in Texas (Henderson 2006; Johnson *et al.* 2016; Muhs and Holliday 1995). In the Covered Area, there are 40 unique soil map units, but the dominant soils in the Covered Area are sandy undulating or hummocky upland soils with deep to very deep sand layers and clay or loamy subsoils (Natural Resources Conservation Service [NRCS] 2020a). Key soil properties for the dominant soils in the system include moderate to high permeability, well drained to excessively drained, negligible surface runoff and water erosion, and moderate to severe wind erosion hazard. Vegetation reduces the wind erosion hazard. Duneland areas contain active sand dunes and sand sheets are dynamic, constantly shifting in direction with the prevailing winds, and are easily eroded and reformed due to sand moved and trapped by wind and vegetation (Muhs and Holliday 1995, 2001; NRCS 2020a). Active sand dunes are generally devoid of vegetation and when present are located on the outer edges or low areas that may temporarily be ponded (NRCS 2020a). Changes in vegetation in dunelands due to drought, fire, precipitation or removal may result in increases or decreases in acreage of dunes, or these dunes may shift in location across the landscape over time (Muhs and Holliday 1995, 2001; Dzialak *et al.* 2013). Areas with dense vegetation have more gradual gently rolling landforms and are more stable (Muhs and Holliday 1995, 2001).

In general, soils within the Covered Area demonstrate very moderate to high wind erosion potential due to sand particle size, absence of vegetation, low organic matter content, and high calcium carbonate content. Conversely, water erosion potential is very low due to the low relief landscape, high water table, and well to excessively drained soils. The dominant soils in the Covered Area that permit growth of vegetation have historically supported rangeland activities and secondarily irrigated agriculture. Dunelands dominated by active sand dunes and sand sheets are not suitable for cultivation, and though they may be used as rangeland, these soils support limited growth of forage for livestock (NRCS 1999, 2020a). These soils are used for recreation and energy development activities (NRCS 1999, 2020a).

### **3.5 Vegetation**

The Covered Area occurs in the High Plains and Trans-Pecos ecoregions (Texas Parks and Wildlife Department [TPWD] 2020b). According to TPWD's ecological land classification, the Covered Area contains as many as 16 different vegetation communities but 99.6% of the Covered Area consists of Sand Prairie, Sandhill Shinnery Duneland, Sandy Shinnery Shrubland, and Active Sand Dunes associated with the High Plains ecoregions (TPWD 2020a). The remaining portions of the Covered Area include various types of barrens, shrublands, grasslands/prairie, vegetated dunelands, depression/riparian wetlands, row crops; and low and high intensity urban development (TPWD 2020c). Descriptions of the four dominant vegetation communities are provided below in Table 4.

**Table 4. TPWD Vegetation Communities in the Covered Area**

<b>Vegetation Community</b>	<b>Description</b>	<b>Vegetation Species Commonly Present</b>
Sand Prairie	Grasslands that occupy deep sands to shallower sandy loam, and sandhills	Giant dropseed ( <i>Sporobolus giganteus</i> ), sand dropseed ( <i>S. cryptandrus</i> ), sand bluestem ( <i>Andropogon hallii</i> ), big bluestem ( <i>A. gerardii</i> ), little bluestem ( <i>Schizachyrium scoparium</i> ), thin paspalum ( <i>Paspalum setaceum</i> ), big sandreed ( <i>Calamovilfa gigantea</i> ), and common sandbur ( <i>Cenchrus spinifex</i> ); woody species including sand sage ( <i>Artemisia filifolia</i> ) and shinnery oak may be present
Sandhill Shinnery Duneland	Shrubland on deep sand or sandhill sites	Shinnery oak; other shrub species commonly encountered including sand sage and honey mesquite; plains yucca ( <i>Yucca glauca</i> ) is a common succulent; giant dropseed, sand dropseed, and Mediterranean lovegrass ( <i>Eragrostis barrelieri</i> ) are common grasses
Sandy Shinnery Shrubland	Areas with sandy soils close to deep sands	Shinnery oak, sand sage and honey mesquite; sand dropseed, little bluestem, annual buckwheat ( <i>Eriogonum annuum</i> ), fringed signalgrass ( <i>Urochloa ciliatissima</i> ), and Mediterranean lovegrass are common grasses
Active Sand Dunes	Areas on deep sand and sandhills lacking significant vegetative cover	Scattered honey mesquite, sand sage, shinnery oak, sand dropseed, sand bluestem, Havard panicum ( <i>Panicum havardii</i> ), Mediterranean lovegrass, and other grasses

Source: Elliott 2014

The Covered Area is heterogeneous and land cover classifications for broad areas depict the dominant land cover for an area and may inadvertently include other land covers that are less dominant. The ecological classification by TPWD maps the Covered Area according to land cover and abiotic features that may or may not be ecologically relevant or at a spatial scale relevant to individuals of the Covered Species. The Covered Species is a territorial habitat specialist of shinnery oak sand dunes with blowouts, or shinnery oak hummocks occasionally interspersed with honey mesquite, and makes localized movements between 65 feet (ft) to 100 ft within home ranges averaging 0.15 acres to 0.25 acres (Hill and Fitzgerald 2007; Ryberg *et al.* 2013; TAMU 2016; Young *et al.* 2018). Thus the Covered Species habitat may be further refined into ecologically relevant categories of land cover for the Covered Species based on the scientific literature and site-specific habitat assessments (Degenhardt and Jones 1972; Fitzgerald *et al.* 1997; Fitzgerald *et al.* 2011; Johnson *et al.* 2016; Sena 1985; Walkup *et al.* 2018).

The Texas State University model (Hardy *et al.* 2018) provides the potential geographic range of what constitutes potential DSL Habitat for purposes of the 2020 DSL CCAA. The model contains four ranked categories of habitat suitability: Shinnery Oak Duneland (High Suitability), Shinnery Oak Honey Mesquite Duneland (Intermediate I Suitability), Shinnery Oak Shrubland (flats) (Intermediate II Suitability), and Shinnery Oak - Honey Mesquite Shrubland (Low Suitability). Figure 1 of the Covered Area shows the locations and spatial extents of each of these categories. Because the model is an approximation of DSL Habitat over a large scale, multiple land cover types at finer local scales may be grouped together under one category.

The 2020 DSL CCAA includes provisions for Participants to conduct habitat assessments on their Enrolled Properties. Based on site-specific surveys on property within the Covered Area, there are six land covers that may be delineated at a site-specific scale in the Covered Area that are ecologically relevant to the Covered Species according to the literature on both the Covered Area and the Covered Species (Degenhardt and Jones 1972; Fitzgerald *et al.* 1997; Fitzgerald *et al.* 2011; Johnson *et al.* 2016; Machenberg 1984; Muhs and Holliday 1995, 2001; Peterson and Boyd 1998; Sena 1985; Walkup *et al.* 2018). These six land covers include: Shinnery Oak Dune I, Shinnery Oak Dune II, Shinnery Oak Flats / Shinnery Oak Mesquite Flats, Grass Dunes, Open Sand Dunes, and Mesquite Shrub. Table A-1 in



Appendix A of the 2020 DSL CCAA lists the predominant landform, vegetation community, dune geomorphology, and soil compaction that characterizes these six land covers. Briefly, the Shinnery Oak Dune I and Shinnery Oak Dune II are dominated by sand dunes and shinnery oak vegetation but differ in the extent and level of connectivity between the shinnery oak sand dunes and amounts of vegetation on the slopes of the blowouts. The Shinnery Oak Flats / Shinnery Oak Mesquite Flats are also dominated by dense amounts of shinnery oak vegetation and contain less topography, smaller sand dunes and isolated shallow blowouts also with moderate to extensive vegetation. The Grass Dunes may contain active sand dunes with extensive herbaceous cover but the dune landform does not contain blowouts. The Open Sand Dunes consist of active sand dunes generally lacking both vegetative cover and blowouts. The Mesquite Shrub is dominated by honey mesquite and little topography but none of the vegetation communities listed below generally align with this land cover.

Major historic threats to this system include overgrazing (Peterson and Boyd 1998) and water supply and distribution for ranching and agriculture (NRCS 1999), which may reduce vegetative cover and lead to an increase in wind erosion. This arid system is a drought adapted system (Peterson and Boyd 1998).

### 3.6 Wildlife

The flat to rolling sandy uplands, dunes and desert grassland support a variety of wildlife adapted to arid ecoregions. Due to the lack of perennial and intermittent natural surface waters, the discussion below is limited to terrestrial fauna. The sand shinnery prairies, dunelands, and shrublands historically supported bison (*Bison bison*), pronghorn (*Antilocapra americana*), black-tailed prairie dogs (*Cynomys ludovicianus*), black-footed ferrets (*Mustela nigripes*), gray wolf (*Canis lupus*), and mountain lion (*Puma concolor*), but currently support mammals with broad ranges and distributions including bobcats (*Lynx rufus*), mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus*), coyote (*Canis latrans*), swift fox (*Vulpes velox*), collared peccary (*Pecari tajacu*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail rabbit (*Sylvilagus audubonii*), porcupine (*Erethizon dorsatum*), badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), ground squirrel (*Spermophilus* spp.), and other smaller rodent species (Griffiths *et al.* 2007; Peterson and Boyd 1998; Wiken *et al.* 2011).

The shinnery shrublands, and mid- and shortgrass prairie support a variety of game birds including scaled quail (*Callipepla squamata*), bobwhite quail (*Colinus virginianus*), mourning doves (*Zenaidura macroura*), and lesser prairie-chickens (*Tympanuchus pallidicinctus*), though current known distribution of the lesser prairie-chicken is out of and north of the Covered Area (eBird 2020; Peterson and Boyd 1998).

Commonly encountered migratory and resident songbirds, perching birds, and predatory birds include pyrrhuloxia (*Cardinalis sinuatus*), northern mockingbirds (*Mimus polyglottos*), oriole species (*Icterus* spp.), sparrows, western kingbirds (*Tyrannus verticalis*), scissor-tailed flycatcher (*Tyrannus forficatus*), greater roadrunners (*Geococcyx californianus*), ravens (*Corvus corax*), and lesser nighthawks (*Chordeiles acutipennis*). Common predatory birds include loggerhead shrike (*Lanius ludovicianus*), curve-billed thrasher (*Toxostoma curvirostre*), the American kestrel (*Falco sparverius*), ferruginous hawk (*Buteo regalis*), Swainson's hawk (*B. swainsoni*), red-tailed hawk (*B. jamaicensis*), northern harrier (*Circus hudsonius*), Harris's hawk (*Parabuteo unicinctus*), borrowing owl (*Athene cunicularia*), great horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), turkey vulture (*Cathartes aura*), and black vulture (*Coragyps atratus*).

Several reptile and amphibian species may be found in the High Plains ecoregion but the Covered Species is part of an assemblage of the following most commonly encountered lizards: marbled whiptail (*Aspidoscelis marmorata*), common spotted whiptail (*A. gularis*), six-lined racerunner (*A. sexlineata*),

side-blotched lizard (*Uta stansburiana*), prairie lizard (*Sceloporus consobrinus*), leopard lizard (*Gambelia wislizenii*), common lesser earless lizard (*Holbrookia maculata*), Texas horned lizard (*Phrynosoma cornutum*), roundtail horned lizard (*P. modestum*), and Great Plains skink (*Plestiodon obsoletus*) (Fitzgerald *et al.* 2011). There may be as many as 25 species of snakes in the High Plains sand shinnery vegetation communities, but commonly encountered species include the coachwhip (*Coluber flagellum*), bullsnake (*Pituophis catenifer*), plains hog-nosed snake (*Heterodon nasicus*), gophersnake (*Pituophis catenifer*), western massasauga (*Sistrurus tergeminus*), prairie rattlesnake (*Crotalus viridis*), and night snake (*Hypsiglena torquata*) (Fitzgerald *et al.* 2011; Peterson and Boyd 1998). Ornate box turtles are also common (*Terrapene ornata*) and arid adapted amphibians including the red-spotted toad (*Anaxyrus punctatus*), Texas toad (*A. speciosus*), spadefoot toads (*Spea* spp.), and tiger salamanders (*Ambystoma tigrinum*) may be seen during precipitation events or near perennial water sources such as stock ponds and cattle tanks (Fitzgerald *et al.* 2011; Peterson and Boyd 1998; [SWCA N. Smolensky pers. obs.])

### 3.7 Listed, Proposed, and Candidate Species

A search on the Service's Information for Planning and Consultation online database (<https://ecos.fws.gov/ipac/>) and the TPWD Rare, Threatened, and Endangered Species of Texas online tool (<https://tpwd.texas.gov/gis/rtest/>) identified four Federally listed species, one species identified as a candidate for Federal listing, and eight State-listed species within the Covered Area. These species and their current listing status, habitat, and occurrence within the Covered Area are provided in Table 5.

State-listed species that are known or are likely to occur within the Covered Area include the Dune Umbrella-Sedge (*Cyperus onerosus*) and the Texas Horned Lizard (*Phrynosoma cornutum*) (Table 5). No Federally listed species occur within the Covered Area. The habitats for the remaining species described in Table 5 are not present in the Covered Area, and therefore, these species are not likely to occur within the Covered Area.

**Table 5. Federal and State Threatened and Endangered Species**

Common Name (Scientific Name)	Federal Listing Status	State Listing Status	Description of Species Habitat	Occurrence within the Covered Area
<b>BIRDS</b>				
American Peregrine Falcon ( <i>Falco peregrinus anatum</i> )	Not listed	Threatened	Present year-round and breeds in west Texas on very tall cliffs in large nests (TPWD 2020d).	No occurrence within the Covered Area
Least Tern ( <i>Sterna antillarum</i> )	Listed Endangered	-	Nests on sandbars, islands, salt flats, and bare or sparsely vegetated sand, shell, and gravel beaches associated with braided streams, rivers, and reservoirs (Campbell 2003; USFWS 2020).	No occurrence within the Covered Area
Northern Aplomado Falcon ( <i>Falco femoralis septentrionalis</i> )	Listed Endangered	-	Only two known south Texas populations; permanent residents of South Texas and may be found nesting and foraging in coastal savannahs, coastal prairies, marshes, tidal flats, grassy plains, open woodlands, and desert grasslands (Brown <i>et al.</i> 2006).	No occurrence within the Covered Area
Piping Plover ( <i>Charadrius melodus</i> )	Listed Threatened	-	Non-breeding resident; prefers bare or sparsely vegetated tidal areas periodically covered with water with limited human disturbance; may include algal flats, beaches, sand flats, and spoil islands (Service 2020).	No occurrence within the Covered Area

Common Name (Scientific Name)	Federal Listing Status	State Listing Status	Description of Species Habitat	Occurrence within the Covered Area
Red Knot ( <i>Calidris canutus rufa</i> )	Listed Threatened	-	Coastal migrant; habitat includes large areas of exposed intertidal sediments (e.g., mudflats) associated with marine and estuarine areas on the shoreline of coasts and bays.	No occurrence within the Covered Area
White-faced Ibis ( <i>Plegadis chihi</i> )	Not listed	Threatened	Large wading bird; occurs in well-drained freshwater marshes or irrigated crop fields. May also occur in brackish waters or saltwater; "currently confined to" in or near coastal areas (TPWD 2020d).	No occurrence within the Covered Area
<b>FISH</b>				
Speckled Chub ( <i>Macrhybopsis aestivalis</i> )	Not listed	Threatened	Known presence within the Rio Grande and Pecos Rivers. Requires flowing water over coarse sand or gravel substrates (TPWD 2020d).	No occurrence within the Covered Area
Pecos Pupfish ( <i>Cyprinodon pecosensis</i> )	Not listed	Threatened	Occurs only within the upper basin of the Pecos River. Requires clear, vegetated spring waters (TPWD 2020d).	No occurrence within the Covered Area
<b>MAMMALS</b>				
Black Bear ( <i>Ursus americanus</i> )	Not listed	Threatened	May occur throughout Texas; requires large tracts of undisturbed forested areas.	No occurrence within the Covered Area
<b>MOLLUSKS</b>				
Texas Hornshell ( <i>Popenaias popeii</i> )	Not listed	Threatened	Found in freshwater streams and rivers with slow to moderate flow; usually stationary, it resides in rock crevices or shelves, however, many be swept up in riffles (TPWD 2020d; Randklev <i>et al.</i> 2017).	No occurrence within the Covered Area
<b>PLANTS</b>				
Dune Umbrella-Sedge ( <i>Cyperus onerosus</i> )	Not listed	Threatened	Gramanoid that occurs in wet and moist soils in swales and other depressions within stable sand dunes (TPWD 2020d).	May occur within the swales and depressions of sand dunes within the Covered Area
<b>REPTILES</b>				
Texas Horned Lizard ( <i>Phrynosoma cornutum</i> )	Not listed	Threatened	Occurs in prairie habitats with sparse vegetation such as grasses, cacti, and scattered scrub; and friable soils in which it can burrow when inactive (TPWD 2020d).	May occur within the Covered Area due to potential suitable friable soils and sparse vegetation structure

### 3.8 Land Use and Ownership

The Covered Area, which encompasses approximately 287,327 acres of modeled potential DSL Habitat, includes portions of Andrews, Crane, Ector, Gaines, Ward, and Winkler Counties (see Figure 1). Lands within the Covered Area include approximately 102,610 acres of Permanent University Fund (PUF) Lands and 21,365 acres of State lands, with the remaining areas (approximately 163,352 acres) being privately owned. There is no Federal regulatory authority to implement a comprehensive land management program for the conservation benefit of the Covered Species on private property in West Texas.

PUF lands within the Covered Area are university endowments established to support educational and health institutions across the University of Texas System and Texas A&M University System (University Lands 2020). Surface use agreements are administered by University Lands for a variety of activities including grazing, hunting, and recreational leases; pipeline, power line, and utility easements; business and commercial site leases; churches, schools, and municipal sites; roads, highways, and highway rest stops; groundwater sales and management; wind farms; and vineyards and wineries (University Lands 2020).

State managed lands within the Covered Area include approximately 17,567 acres of State Trust Lands managed by the Texas General Land Office and approximately 3,798 acres of State park lands managed by the TPWD. All of the State park lands within the Covered Area are associated with the Monahans Sandhills State Park, which is located in the Llano Estacado, also known as the “Staked Plains,” region of West Texas in Ward and Winkler Counties. The park offers outdoor recreational activities, including hiking of the park’s sand dunes, camping, and picnicking (TPWD 2020b).

Mineral estates are present in the Covered Area. In some cases, the ownership of the surface estate and mineral estate are severed (i.e., the surface owner has no rights to the underlying mineral estate that is owned by a different individual); these cases are referred to as “split estates.” In Texas, owners or lessees of the mineral portion of a split estate have the right to access and use the amount of surface that is reasonably necessary to produce and remove minerals. As described in the 2020 DSL CCAA, there was a total of 291 wells on TCP-enrolled properties in the TCP permit area, which is the same as the Covered Area in the 2020 DSL CCAA, during the 2012 to 2017 period; 55 of these wells (or approximately 19%) were stratified.

In 2017, industrial sand mining operations began within the Covered Area. Companies buy or lease large sections of contiguous acreage for excavation and processing. Certain individual mining companies hold over 30,000 acres within the Covered Area, although the majority of mines are on parcels encompassing 2,000 to 15,000 acres.

Land uses within the Covered Area include energy development activities, such as wind and solar energy production sites, drilling of oil and gas wells, and development of associated infrastructure such as roads and power lines; recreation such as hunting, wildlife viewing, camping, and other recreational opportunities offered at the Monahans Sandhills State Park; livestock grazing; local government (road maintenance, etc.) and agricultural activities (mostly limited to Gaines County). The Covered Area is dominated by non-irrigated land that supports primarily livestock, including ranching, and poultry farms (National Agricultural Statistics Service 2017). Croplands are used for wheat in Andrews and Gaines Counties and corn and sorghum in Gaines County. There are no or negligible harvested crops in other counties in the Covered Area.

There are no Federal lands, state wildlife management areas or other state conservation lands, agricultural land easements, Prime Farmland, or Unique Farmland within the Covered Area. As a result, these resources are not further discussed.

### **3.9 Cultural Resources**

NEPA recognizes that a unique character of an environment includes its relation to “historic or cultural resources” and requires agency officials to consider the degree that an action might “adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the NRHP” (40 CFR 1508.27 (b)(3) and 40 CFR 1508.27 (b)(8)). However, under NEPA, no definition is provided for “cultural resources.”

The National Register of Historic Places (NRHP), which was established under the NHPA (54 USC § 300101, *et seq.*), identifies historic properties (i.e., locations eligible for listing or listed on the NRHP) based on their relationship to significant historic events or individuals, important stylistic or engineering trends, or in their potential to provide information about the local, regional, or national past (36 CFR 60[a-d]). Historic properties are sites, buildings, objects, and structures and may include archaeological sites, historic structures, historic districts, landscapes, battlefields, or shipwrecks. Also included are Traditional Cultural Properties (TCPs), which may be defined as locations which are eligible for inclusion in the NRHP due to their association with practices or beliefs of a modern community that are tied to a community's sense of history, place, or identity (Parker and King 1998). In addition to being significant in American history, architecture, archaeology, engineering, and culture, properties must maintain sufficient integrity to convey their significance; the National Park Service (NPS) has defined seven aspects of integrity, all or most of which must be present to convey the significance of the historic property (NPS 1997: 44). These aspects include integrity of location, design, setting, materials, workmanship, feeling, and association. Different properties may display these aspects in unique ways.

Humans have occupied portions of West Texas, including the Covered Area, for at least 12,000 years leaving their mark on the landscape. Climatic conditions have varied widely during that period, such that areas that currently appear nearly uninhabitable may have been much more verdant in the past. The variation in climatic conditions have resulted in varying human adaptations to the environment, a pattern that is reflected in the physical record of human habitation of the region. Archaeological sites may include rock shelters, scatters of lithic materials, rock art sites, and the remains of massive earth and rock ovens. When the Spanish sporadically began to make contact with and influence Native American tribes in the region 450 years ago, the Covered Area was inhabited by a poorly documented group identified as the Jumanos. By the late 1700s, European encroachments in east and south Texas resulted in the displacement of other Native groups. Groups documented later in the region include the Lipan Apache and Comanche. Intensive European occupation of the area began in the mid-to-late nineteenth century, as Mexican, Texian, and Texan settlers and soldiers continued to push Native Americans from the region. The Covered Area formed a disputed area between the Republic of Texas/ United States and Mexico until the end of the Mexican American War in 1848. An economy largely based on cattle ranching was upended in the early twentieth century as oil and gas exploration transformed the West Texas landscape.

Portions of the Covered Area have been previously surveyed for cultural resources. According to the Texas Archeological Sites Atlas (TASA) and New Mexico Cultural Resources Inventory System (NMCRIIS), restricted-access online databases, approximately 73 previously recorded cultural resources investigations have been conducted within the Covered Area or within 1 mile of the Covered Area (Texas Historical Commission [THC] 2020; New Mexico Historic Preservation Division [NMHPD] 2020). While the level of investigation and intensity of research often varies between projects, approximately 2 percent (5,520 Acres) of the Covered Area has been surveyed at some level for cultural resources. Approximately 1.2 percent (4,530 acres) of the area within 1 mile of the Covered Area has been surveyed for cultural resources. Records on TASA are limited to projects conducted for NHPA Section 106 or Antiquities Code of Texas review and may not include all investigations within an area.

As a result of previous investigations, 69 archaeological sites have been identified in the Covered Area. An additional 145 archaeological sites have been identified within 1 mile of the Covered Area in both Texas and New Mexico. No historic structures or cemeteries have been recorded in the vicinity. In addition, no NRHP individual properties or districts have been recorded within, or within 1 mile of, the Covered Area.

## 4 ENVIRONMENTAL CONSEQUENCES

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### 4.1 Overview

#### 4.1.1 *Impact Estimation Approach*

NEPA requires that agencies include a detailed statement of, among other things, the environmental impacts of the Proposed Action and a description of adverse environmental impacts that would not be avoided should the Proposed Action be implemented (42 USC 4332).

The 1978 NEPA regulations also indicate agencies should identify three types of impacts: direct, indirect, and cumulative (40 CFR 1508.8). To achieve this in an efficient manner, agencies aim to focus on impacts that are “reasonably foreseeable” and have a close causal relationship to the Proposed Action. On July 16, 2020, CEQ finalized new implementing NEPA regulations that become effective on September 14, 2020. The new regulations apply to all NEPA processes begun after the effective date of the new rules, but provide agencies with discretion to apply the new rules to ongoing NEPA processes. The NEPA process for this Proposed Action was initiated prior to the effective date of the new NEPA regulations with publication of the Notice of Intent in the Federal Register on July 16, 2020. This draft environmental assessment is intended to comply with the 1978 regulations and the Department of the Interior’s existing NEPA regulations.

Based on applicable NEPA regulations, this NEPA analysis is limited to only those resources that would be impacted by the issuance of the Permit requested by the Applicant for activities covered in the 2020 DSL CCAA.

#### 4.1.2 *Impact Framework*

This EA analyzes the impacts of the Proposed Action and No Action Alternative using an analysis impact framework to indicate the degree of the effect. The Service may select a permit term or take authorization level between that proposed in the no action alternative and the proposed action. The purpose of establishing this impact framework is to provide a uniform method for assessing impacts with regard to their duration and intensity, which will be used with the context of the impact in determining significance(40 CFR 1508.27), for a variety of resources to provide a means of categorizing potential impacts for the public and agency decision-maker. Across all resources, context and intensity are analyzed relative to whether the change or disturbance is detectable, measurable or perceptible. Table 6 provides a summary of the thresholds of used in this EA.

**Table 6. Impact Indicator, Duration and Intensity by Resource**

Resource	Impact Indicator and Duration	Intensity of Impact
Covered Species	Indicator: Disturbance or change to DSL Habitat.	Negligible: No disturbance or change within populations (local), across the species range in Texas (regional), or across the entire species range in Texas and New Mexico (national).
	Short-term: Impacts would not be seen or be temporary and full recovery and benefits would occur within 5 to 10 years.	Minor: Change or disturbance is small, local and short-term.
	Long-term: Impacts would last and full recovery and benefits would occur later than 10 years.	Moderate: Impacts may result in substantial changes to population size, distribution or genetic in a limited area, or may be a small impact distributed over a large portion of the range of the species.

Resource	Impact Indicator and Duration	Intensity of Impact
		Major: Change or disturbance is large, regional or national; change or disturbance would adversely affect the Covered Species throughout a significant proportion of its range; disturbance or change would be either short-term or long-term.
Hydrology and Water	<p>Indicator: Change to water quantity or quality of aquifers</p> <p>Short-term: Impacts would not be seen or be temporary and return to baseline conditions of water levels and trends; benefits would occur within 5 to 10 years.</p> <p>Long-term: Impacts would last and water levels and trends would persist as a consequence and benefits would occur later than 10 years.</p>	<p>Negligible: No change on an Enrolled Property or within a perched aquifer (local) or within underlying aquifer(s) (regional).</p> <p>Minor: Change would be small, local and short-term.</p> <p>Major: Change would large, regional, and violate state regulations of groundwater use or public safety on drinking water supply; change would be either short-term or long-term</p>
Soils	<p>Indicator: Change to soil erosion potential or productivity.</p> <p>Short-term: Impacts would not be seen or be temporary and return to baseline conditions of erosion potential and productivity levels within 5 to 10 years.</p> <p>Long-term: Impacts would last and persist as a consequence and benefits would occur later than 10 years last.</p>	<p>Negligible: No change within a sand dune complex or within another landform on an Enrolled Property (local), nor within landforms across the Covered Area (regional).</p> <p>Minor: Change would be small, local and short-term.</p> <p>Moderate: Disturbance may result in substantial modifications of soil in a limited area, or may be a small impact distributed over a large portion of a soil type. Major: Change would be substantial modification of soil erosion potential and adversely affecting productivity across the landform at a regional scale; change would be either short-term or long-term.</p>
Vegetation	<p>Indicator: Disturbance or change to vegetation community</p> <p>Short-term: Impacts would not be seen or be temporary, and full reestablishment of plant community would occur within 1 to 5 years depending on the vegetation community.</p> <p>Long-term: Impacts would last and persist as a consequence, full reestablishment of plant community would require more than 5 years; benefits would be observed for more than 5 years.</p>	<p>Negligible: No disturbance or change to vegetation community within a sand dune complex or within another landform on an Enrolled Property (local), nor within landforms across the Covered Area (regional).</p> <p>Minor: Disturbance or change would be small, local and short-term.</p> <p>Moderate: Disturbance may result in substantial modifications of vegetation in a limited area, or may be a small impact distributed over a large portion of a vegetation type.</p> <p>Major: Disturbance or change would be substantial modification of existing vegetation community, regionally and either be short-term or long-term; change or disturbance would adversely affect any Federal or state listed plant species throughout a significant proportion of its range.</p>
Wildlife	<p>Indicator: Disturbance or change to wildlife habitat</p> <p>Short-term: Impacts would not be seen or be temporary, and full reestablishment of wildlife habitats would occur within 1 to 5 years depending on the habitat.</p> <p>Long-term: Impacts would last and persist as a consequence, full reestablishment of wildlife habitat would require more than 5</p>	<p>Negligible: No disturbance or change within landform(s) on an Enrolled Property (local) nor within landforms across the Covered Area (regional).</p> <p>Minor: Disturbance or change would be small, local and short-term.</p> <p>Moderate: Disturbance may result in substantial modifications of habitat for wildlife in a limited area, or may be a small impact distributed over a large portion of a habitat type.</p> <p>Major: Disturbance or change would be substantial modification of habitat for wildlife, regionally and either be short-term or long-term.</p>

Resource	Impact Indicator and Duration	Intensity of Impact
	years; benefits would be observed for more than 5 years.	
Listed, Proposed, and Candidate Species (not Covered in the CCAA)	<p>Indicator: Loss, disturbance, or modification of suitable habitat; displacement, injury, or mortality of species</p> <p>Short-term: Impacts would not be seen or be temporary, and full reestablishment of suitable habitat or recolonization would occur within 1 to 5 years depending on the habitat or species.</p> <p>Long-term: Impacts would last and persist as a consequence, full reestablishment of suitable habitat or recolonization would require more than 5 years; benefits would be observed for more than 5 years.</p>	<p>Negligible: No loss, disturbance or modification of suitable habitat; no injury displacement, injury, or mortality of species would occur on an Enrolled Property (local), or across available suitable habitat throughout the range of species within the Covered Area (regional).</p> <p>Minor: Loss, disturbance or modification of suitable habitat would be small, local and short-term; injury or mortality of species could be limited to one or a few individuals.</p> <p>Major: Loss, disturbance or modification of suitable habitat would be substantial, occur regionally, and either be short-term or long-term; injury or mortality of species would result in long-lasting population-level impacts.</p>
Land Use and Ownership	<p>Indicator: Change or restriction to or conversion of land use</p> <p>Short-term: Impacts would not be seen or be temporary and occur less than a period of less than one year.</p> <p>Long-term: Impacts would last and persist as a consequence, and would occur over a period of more than one year.</p>	<p>Negligible: No change or restriction to land use within an Enrolled Property (local) or among landowners' properties within the Covered Area (regional).</p> <p>Minor: Change or restriction to land use would be local and short-term</p> <p>Major: Change or restriction to land use would be substantial, regional and long term; landowners or users would be subjected to use restrictions or delays in obtaining permits or leases</p>
Cultural Resources	<p>Indicator: Loss or destruction of the characteristics of a resource that make the resource eligible for the NRHP.</p> <p>Short-term: Impacts would be temporary and reversible.</p> <p>Long-term: Impacts would last and persist as a consequence, and would be irreversible.</p>	<p>Negligible: No detectable or measurable change to cultural resources or NRHP eligible places within the Covered Area.</p> <p>Minor: Short-term or long-term impacts to one or more NRHP-listed or NRHP-eligible properties would occur, but the resource(s) would retain the characteristics that make them eligible for the NRHP.</p> <p>Major: Long-term impacts to one or more NRHP-listed or NRHP-eligible properties resulting in a loss of the characteristics that made the properties eligible for the NRHP.</p>

### 4.1.3 Summary of Impacts

Table 7 summarizes potential impacts on resources from implementation of Alternative A – Proposed Action and Alternative B – No Action Alternative, which are analyzed in detail in Sections 4.2 through 4.7.



**Table 7. Impact Summary**

<b>Resource</b>	<b>Alternative A – Proposed Action</b>	<b>Alternative B – No Action Alternative</b>
Covered Species	Moderate to major, short- to long-term impacts; minor to moderate, short- to long-term benefits	Moderate to major, short- to long-term impacts; minor, short- to long-term benefits;
Hydrology and Water	Negligible	Negligible
Soils	Minor to major, short- to long-term impacts; minor short-term benefits	Minor to moderate, short- to long-term impacts; minor short-term benefits
Vegetation	Minor to moderate, short- and long-term impacts; minor to moderate short- to long-term benefits	Minor to moderate, short- to long-term impacts; minor short- to long-term benefits
Wildlife	Minor to moderate, short-term impacts; short- to long-term benefits	Minor to moderate, short- to long-term impacts; minor short- to long-term benefits
Listed, Proposed, Candidate Species (not Covered in the CCAA)	No federally listed species present; and for State listed species minor to moderate short- to long-term impacts; minor ; short- to long-term benefits	No federally listed species present; and for State listed species minor to moderate, short- to long-term impacts; minor short- to long-term benefits
Land Use and Ownership	Short- to long-term minor to moderate impacts; Short- to long-term benefits	Short- to long-term minor to moderate impacts; no benefits
Cultural Resources	No Impact, short-to long-term benefit	No Impact

## 4.2 Covered Species

### 4.2.1 *Alternative A – Proposed Action*

Under the Proposed Action, Participants engaged in Covered Activities would implement Conservation Measures (*see* Section 2.1.4) to reduce the impacts of the Covered Activities within the Covered Area. The Conservation Measures are designed to provide a net conservation benefit by reducing and eliminating threats to the Covered Species through avoiding and offsetting the amount of anticipated take of the Covered Species, which is represented by the acreage of disturbance or loss of DSL Habitat. Under the Proposed Action, the Participants would avoid or minimize new disturbances including coordination between the 2020 DSL CCAA Administrator and non-Participants to maximize use of existing infrastructure, access roads, and rights-of-way (ROW) and minimize the footprint of development, traffic, and use of OHV consistent with the terms of the CCAA. The Participants engaging in Covered Activities associated with oil and gas, sand mining operations, renewable energy operations, and linear infrastructure would avoid new surface disturbance in areas categorized as High or Intermediate Suitability DSL Habitat under the Texas State University model (Hardy *et al.* 2018), subject to certain exceptions and requirements including disturbance limits, payment of Habitat Conservation Fees, feasibility constraints, and specified thresholds of oil well pad densities. Participants conducting seismic activities would refrain from using heavy machinery in these areas. Participants conducting agriculture or ranching Covered Activities would also refrain from initiating new or increased levels of agricultural and ranching in areas categorized as High or Intermediate Suitability DSL Habitat. Sand mining Participants would implement an annual limit on new surface disturbance on their Enrolled Properties and avoid areas

where site-specific surveys for the Covered Species indicate potential presence based on ground cover types or detection of individuals, unless that new surface disturbance can be offset as described in the 2020 DSL CCAA. The 2020 DSL CCAA Administrator would work with Participants and non-Participants in the Covered Area to limit disturbance to 34,940 acres of DSL Habitat, or approximately 12% of the Covered Area, over the CCAA and permit term. Although avoidance is subject to certain exceptions, and there may still be loss, modification, and fragmentation of habitat, the disturbance limits and offsets are still anticipated to reduce threats to the Covered Species by minimizing the threat of habitat loss. The CCAA as written does not address the genetic components of the species identified in the populations identified by Chen et al 2020.

Prior to new disturbance of DSL Habitat, Participants would pay fees that would be used for Conservation Actions, including restoration and reclamation of disturbed areas, or would conserve lands similar to those subject to disturbance at a 1:1 acre ratio (*see* Chapter 8.4 of the 2020 DSL CCAA). Fees would be used to protect, restore, reclaim, and re-grade existing and newly disturbed areas. Participants conducting Covered Activities in the Covered Area would also restore, reclaim and re-grade disturbed areas, as determined by participation requirements of the 2020 DSL CCAA. During restoration, reclamation and re-grading activities, the Covered Species may be inadvertently killed through use of heavy equipment during ground disturbing activities.

Prioritizing avoidance of High or Intermediate Suitability DSL Habitat throughout the Covered Area would temporarily and permanently benefit populations of the Covered Species by not curtailing movement and distribution of individuals present in those habitat areas (Hibbitts *et al.* 2013; Johnson *et al.* 2016; Sias and Snell 1998; Young *et al.* 2018). Fragmentation of habitat may be reduced through incentives and prioritization of Covered Activities outside of areas used by Covered Species and into areas of existing disturbance. These measures and other measures to exclude entry or allow escape of the Covered Species into or from areas of disturbance may also reduce potential loss of individuals or of nests that would be avoided as a result of the Conservation Measures. There is no consideration specifically in the CCAA for reducing fragmentation or habitat loss to the point where meta-populations and the four phylogenetic groups in the covered area identified by Chan *et al.* (2020) can be maintained. While the general avoidance of high and intermediate suitability habitats may reduce these impacts, the exceptions to this avoidance reduces the effectiveness of these conservation measures in maintaining genetic representation, resilience and redundancy need to ensure the species long term survives.

Conservation Measures designed to conserve groundwater may indirectly benefit the Covered Species if use of groundwater negatively affects the vegetation or dune structure of occupied or potentially suitable habitat of the Covered Species (Machenberg 1984; Muhs and Holliday 1995, 2001; Peterson and Boyd 1998). However, the pumping of subsurface ground water from sand mines is likely to result in impacts to surrounding vegetation, especially when exasperated by drought conditions. Information on groundwater supply and use is limited in the Covered Area; therefore, the extent of benefits this measure may have on the Covered Species is unknown.

Loss, modification, and fragmentation of habitat may occur under the Proposed Action; however, avoidance of priority habitat, disturbance limits, and offsets would temporarily and permanently reduce impacts to the Covered Species and minimize habitat loss. Implementation of the Conservation Measures as feasible may result in temporary and permanent protection, conservation, and restoration of DSL Habitat throughout the Covered Area and may result in an increase in likelihood of use by the Covered Species relative to the amount of participation in the 2020 DSL CCAA. As a result, the Proposed Action is likely to result in short- to long-term moderate to major impacts from habitat loss, fragmentation, and impacts on the genetic representation. It is likely to have minor to moderate, short- to long-term benefits

may be realized depending on the level of enrollment, consistency of avoidance and minimization to protect habitat as it cannot be restored on human timeframe.

#### **4.2.2      *Alternative B – No Action Alternative***

Under the No Action Alternative, industry, local government and agricultural activities are anticipated to continue at current levels. The potential impacts to the Covered Species are anticipated to occur in the form of loss, modification, degradation, or fragmentation of DSL habitat. Surface disturbance within the Covered Area that may be located in DSL habitat would not be subject to additional conservation measures to avoid, minimize, or offset potential impacts to the Covered Species. In particular, there would be no required disturbance limits in areas of High and Intermediate Suitability DSL Habitat. As a result, there may be a loss of individuals or nests, or avoidance by individuals from areas where surface development activities are occurring in occupied habitat due to the use of heavy machinery and OHV, seismic activities, and other survey and exploration efforts associated with development. Conservation, protection, restoration, and reclamation may not occur or may occur at smaller scales relative to the Proposed Action. There would be no specific avoidance of high and intermediate suitability habitats other than where it overlaps with the TCP habitat definitions. Then it would be subjected to impacts from participants under the authorized impacts within the habitat classifications in the TCP. There would be no well density thresholds or limits on sand mining impacts. Therefore, there would be less happenstance conservation of the meta-populations and the four phylogenetic groups in the covered area identified by Chan *et. al.* (2020). So the impacts on species genetic representation, resilience and redundancy would be anticipated to be greater under this alternative. Conservation activities would be implemented at the discretion of the landowner or user at a project-specific scale for entities not enrolled in the TCP. As a result, long-term, moderate impacts would occur under the No Action Alternative, and any short- to long-term benefits that would occur under the No Action Alternative as a result of the TCP or conservation activities implemented by individual landowners or users might not be offset.

Under the No Action Alternative, industries and landowners would operate and manage lands as they currently do with no additional requirements or incentives to minimize their impacts on the DSL beyond those that currently exist or are voluntarily implemented. Any beneficial effects or reduction of negative impacts on the DSL that may result from the implementation of the 2020 DSL CCAA would not occur under this alternative. The No Action Alternative would likely result in short- to long-term moderate to major impacts do to habitat loss and fragmentations and impacts on the genetic representation. The No Action Alternative is likely to provide minor, short- to long-term benefits through the TCP and ongoing land management actions of property owns.

### **4.3      Hydrology and Water Resources**

#### **4.3.1      *Alternative A – Proposed Action***

Under the Proposed Action, groundwater would be used for Covered Activities occurring in the Covered Area. Conservation Measures would be implemented to minimize groundwater use and provide site-specific data on water use through the development and implementation of water use and minimization plans. Each plan includes monitoring and annual performance reports that would be submitted by the Participants to the Administrator. Participants of the sand mining industry would also complete a TWDB water use survey containing information on groundwater drawn by aquifer. Other Conservation Measures associated with surface landscape management (as discussed in Section 4.4 and 4.5) would also indirectly reduce impacts from the Covered Activities related to groundwater flows, infiltration, and recharge.

Given the limitations of groundwater use data within and beyond the Covered Area, the impacts of these Conservation Measures on the groundwater supply cannot be quantitatively analyzed. While the development and implementation of site-specific water use and minimization plans would reduce groundwater usage in the Covered Area, these benefits, which would occur over the long-term, are not anticipated to be detectable or perceptible. Similarly, these benefits to dune-stabilizing vegetation are not anticipated to be detectable or perceptible. Therefore, the Proposed Action would result in negligible changes to groundwater resources within the Covered Area.

### **4.3.2      *Alternative B – No Action Alternative***

Under the No Action Alternative, private, commercial and industrial activities, such as Covered Activities including construction, oil well pad development and drilling, sand mining, linear infrastructure construction, maintenance and operation, agriculture and ranching, and local government activities would continue within the Covered Area without the conservation benefits of the 2020 CCAA. Groundwater conservation for the Ogallala Aquifer would continue to be managed by the Llano Estacado Underground Water Conservation District; groundwater conservation for the Pecos Valley and Dockum Aquifers would continue to be implemented at the discretion of the landowner. Voluntary conservation measures would continue under the existing TCP (Service *et al.* 2011) to avoid and minimize impacts to surface disturbance would continue; however, there are no conservation measures in the TCP aimed at the reduction of water use or the protection or management of water resources. Therefore, the No Action Alternative would result in fewer voluntary conservation measures for groundwater resources barring any required reporting of water use to the state of Texas, and may lead to more groundwater use within the Covered Area compared to the Proposed Action Alternative.

## **4.4      Soils**

### **4.4.1      *Alternative A – Proposed Action***

The total maximum surface disturbance associated with the Covered Activities in the Covered Area is 34,940 acres. Surface disturbance during restoration, reclamation and re-grading would temporarily result in the disturbance of localized soils. Surface disturbance associated with the Covered Activities would be subject to Conservation Measures to reduce direct impacts to the soils and increase conservation of soils in the Covered Area. All Participants for all Covered Activities except the agriculture and ranching sectors would implement Conservation Measures to avoid new surface disturbance through coordination on use of existing infrastructure, access roads, and ROWs. Reduced development footprints are intended to reduce the amount of surface disturbance on Enrolled Properties. Implementing site specific plans to maximize use of existing infrastructure, access roads and ROWs and minimize the footprint of development, traffic and use of OHV would reduce the direct adverse impacts on soils pertaining to their removal and disturbance. Conservation Measures would be implemented to restore ROWs, reclaim abandoned oil well pads and roads, and re-grade disturbed areas. These activities would minimize the loss and alteration of soils in the Covered Area. The reduction of surface disturbance would also reduce wind erosion and vegetation removal (by preserving sand dune stabilizing vegetation), thereby indirectly reducing the loss and alteration of soils (Machenberg 1984; Muhs and Holliday 1995, 2001; NRCS 2020).

Under the Proposed Action, all Participants would be required to avoid High and Intermediate Suitability Habitat of the Covered Species for all Covered Activities subject to a set of sector-specific exceptions, and shift their operations out of DSL Habitat to areas categorized as Low Suitability Habitat or to areas with existing development (e.g., where oil well pad densities are greater than 13 wells pads/mi<sup>2</sup>). Dynamic dunelands, which are more susceptible to wind erosion from vegetation removal, are found in

the High and Intermediate Suitability Habitat. By shifting activities away from dunelands to relatively flatter and more stable areas less susceptible to wind erosion (Machenberg 1984; Muhs and Holliday 1995, 2001; NRCS 2020), soil losses and alterations would be reduced.

Conservation Measures would be implemented for Covered Activities related to sand mining including limiting annual surface disturbance to 60 acres, total disturbance per mine on enrolled parcel to 1,380 acres, and total surface disturbance for the entire sector to 16,560 acres for the term of the proposed 2020 DSL CCAA. Caps on new surface disturbance would limit to new surface disturbance in the Covered Areas to less than 6% (16,560 acres) of DSL Habitat in the Covered Area (287,327 acres). All new surface disturbances would be subject to offsets either through payment of fees that would be used for Conservation Actions including restoration and reclamation of disturbed areas or through conservation of areas similar to those subject to disturbance at a 1:1 acre ratio. Conservation Measures to reduce and manage use of groundwater for the sand mining industry would reduce the amount of water used and help maintenance of ground water needed to stabilize sand deposits beneath the dunes and supply water for vegetation on the dunes, thereby indirectly reducing impacts to soils in these areas (Machenberg 1984; Muhs and Holliday 1995, 2001; Peterson and Boyd 1998).

Soil loss and alteration from the Covered Activities would be reduced under the Proposed Action through avoidance and conservation of High and Intermediate Suitability Habitat containing dynamic dunelands and through reduced surface disturbance. In addition, a portion of the fees collected for participation in the proposed CCAA may be used to purchase conservation easements to preserve DSL habitat and its associated vegetation communities in large, continuous blocks for at least the life of the 2020 DSL CCAA, thereby reducing the areas of soil disturbance and the conservation of existing soils if utilized by the administrator. As a result, the Proposed Action is likely result in short to long-term, minor to major impacts from disturbance of surface soil and removal of sand sediments in the dunes by disturbing the dynamics of the dunes geomorphology; and minor short- -term benefits to soils in the Covered Area will occur through implementation of minimization measures and caps on annual surface disturbance by mine participants.

#### **4.4.2      *Alternative B – No Action Alternative***

Under the No Action Alternative, all Underlying Activities would continue engaging in surface disturbing activities, such as construction, oil well pad development and drilling, sand mining, linear infrastructure construction and operation, local government activities, and agriculture and ranching, within the Covered Area. Voluntary conservation measures would continue under the existing TCP (Service *et al.* 2011) to avoid and minimize impacts on soils. Participants enrolled in the TCP would limit surface disturbance of soils on up to 2,125 acres. These participants would implement voluntary conservation measures including avoidance of soils suitable for the Covered Species, restoration, rehabilitation and erosion control measures to avoid, minimize, and mitigate the loss and degradation of soils (Service *et al.* 2011).

Activities conducted by non-participants in the TCP are anticipated to continue at current levels, and surface disturbance within the Covered Area would not be subject to additional conservation measures to minimize or avoid impacts to soils. As a result, up to 34,690 acres may be disturbed over the term of the CCAA, resulting in the loss and alteration of soils from non-participant activities including vegetation clearing, grading, use of heavy machinery, construction of facilities, excavation, mining, application of caliche or other materials onto the surface, and application of herbicide to vegetation. As described in Section 3.3, soils within the Covered Area demonstrate moderate to very high wind erosion potential. Surface disturbance under the No Action Alternative would result in the removal of vegetation that would

indirectly subject soils to increased wind erosion, leading to the loss of soils, particularly the fine sandy particulates (Machenberg 1984; Muhs and Holliday 1995, 2001; NRCS 2020).

Industry sectors would not be subject to the implementation of conservation measures to avoid surface disturbance in areas categorized as High and Intermediate Suitability DSL Habitat contained in the 2020 DSL CCAA. Removal of vegetation in dunelands, which are more susceptible to wind erosion from vegetation removal, may result in increases or decreases in acreage of dunes, or these dunes may shift in location across the landscape over short-term and long-term timeframes (Machenberg 1984; Muhs and Holliday 1995, 2001; Dzialak *et al.* 2013). Similar impacts of alteration in geomorphology of the dunes, including those in areas extending beyond the activity area, may occur in the form of pile up of sand near structures or removal of sand during the removal or alteration of vegetation (Machenberg 1984). Winds carrying loose sand may harm adjacent vegetation via abrasion and sandblasting, thereby hindering plant recolonization in disturbed areas (Machenberg 1984). While these changes may occur under either Alternative, the potential for greater dune vegetation disturbance under this Alternative may result in increased erosion.

Under the No Action Alternative, impacts to soils would continue at current levels. Surface disturbance from participants enrolled in the TCP would continue but would be limited to up to 2,125 acres. Surface disturbance from non-participants of the TCP would continue to occur without conservation measures to avoid or minimize the loss or alteration of soils. As a result, the No Action Alternative would result in short- to long-term, minor to major widespread impacts as described above and minor short- to long-term, localized benefits due to disturbance limits on TCP participants.

## **4.5 Vegetation**

### **4.5.1 Alternative A – Proposed Action**

Surface disturbance under the Proposed Action would occur, resulting in the disturbance or removal of vegetation. Surface disturbance associated with the Covered Activities would be subject to Conservation Measures to reduce impacts to vegetation, such as limiting the amount of acres disturbed and encouraging smaller disturbance footprints. Under the Proposed Action, the entire area where surface disturbance would occur would be subject to Conservation Measures to reduce impacts to vegetation and augment conservation of vegetation in the Covered Area. All Participants except the agriculture and ranching sector and local governments would implement site specific plans to maximize use of existing infrastructure, access roads, and ROWs and minimize the footprint of development, traffic and use of OHV. Implementation of site-specific plans would reduce the direct adverse impacts on vegetation pertaining to their removal and disturbance. Conservation Measures would be implemented to restore and reclaim ROWs, reclaim abandoned oil well pads and roads, re-vegetate disturbed areas with native plants, and re-grade disturbed areas. All surface disturbance associated with Covered Activities except the agriculture and ranching sector must be offset as described for soils (*see* Section 4.3.1). These activities would reduce and minimize the disturbance, removal or modification of vegetation during restoration, reclamation and re-grading. Over the long-term, these activities would help reestablish vegetation throughout the Covered Area and would not change the overall viability of plant communities, but it is not clear whether full restoration is likely to occur.

Under the Proposed Action, all Participants would be required to avoid High and Intermediate Suitability Habitat of the Covered Species for all Covered Activities subject to a narrow set of sector-specific exceptions, and shift their operations out of DSL Habitat, to areas categorized as Low Suitability Habitat, or to areas with existing development. Honey mesquite is an invasive species (NRCS 2020b) found in

Low Suitability Habitat. By shifting Covered Activities to Low Suitability areas that may contain honey mesquite, this invasive species would be removed as part of development activities. Minimizing disturbance in High and Intermediate Suitability habitat would reduce native vegetation removal, including vegetation that provides habitat for the Covered Species, such as the shinnery oak.

Conservation Measures are also aimed at reducing the spread of invasive plant species by avoiding non-native vegetation; using habitat appropriate native vegetation and best management practices, such as cleaning vehicles coming into the area to remove mud and seeds; and identifying and removing any invasive vegetation incidentally introduced during the Covered Activities. These proposed measures may reduce competition of available resources between native and invasive plant species (Machenberg 1984 Peterson and Boyd 1998). Aerial application of herbicides would be avoided to reduce risk of herbicide drift to non-target areas and thus measure and control of invasive plant species. These activities would reduce invasive plant species and would support native vegetation and vegetation communities, including those that provide habitat for the Covered Species.

Conservation Measures would be implemented for Covered Activities related to the sand mining including caps on annual surface disturbance and offsets of surface disturbance, as described in Section 4.3, Soils. Limits to surface disturbance would minimize or avoid the removal of vegetation. Conservation Measures to reduce and manage use of groundwater for the sand mining industry would reduce impacts on vegetation and vegetation communities from the removal of water from pits in the sand mine, which is the groundwater in perched aquifers and subsurface water supply for vegetation in the Covered Area (Machenberg 1984; Peterson and Boyd 1998).

Conservation Measures would minimize or avoid disturbance to or removal or modification of vegetation during surface disturbance, restoration, reclamation, and re-grading activities. Where surface disturbance would occur in the Covered Area, a portion of fees collected for participation in the proposed 2020 DSL CCAA could be used to purchase conservation easements and other protections to preserve DSL habitat and its associated vegetation communities in large, continuous blocks for at least life of the 2020 DSL CCAA, thereby reducing the areas of surface disturbance and removal of vegetation. Conservation Measures would help minimize disturbance to vegetation and would help support the re-establishment of vegetation communities over the long-term. As a result, the Proposed Action would likely result in short- and long-term, minor to moderate impacts from the soil impact on sediment movement and loss of shinnery oak from clearing in unavoidable high and intermediate suitable DSL habitats and the inability to re-establish shinnery oak. The Action Alternative is likely to provide minor to moderate, short- and long-term benefits to vegetation in the Covered Area depending on enrollment and feasibility.

#### **4.5.2 Alternative B – No Action Alternative**

Under the No Action Alternative, all Covered Activities would continue to engage in surface disturbing activities, such as construction, oil well pad development and drilling, sand mining, linear infrastructure construction, maintenance and operation, local government activities, and agriculture and ranching within the Covered Area. Voluntary conservation measures would continue under the existing TCP (Service *et al.* 2011) to avoid and minimize impacts on vegetation. Participants enrolled in the TCP would limit surface disturbance of on up to 2,125 acres, thereby limiting disturbance or removal of vegetation. These participants would implement voluntary conservation measures including avoidance of areas suitable for the Covered Species, restoration, rehabilitation and erosion control measures to avoid, minimize, and mitigate the loss and degradation of vegetation (Service *et al.* 2011).

Activities conducted by non-participants in the TCP are anticipated to continue at current levels, and surface disturbance within the Covered Area would not be subject to additional conservation measures to

minimize or avoid impacts to vegetation. As a result, up to 34,690 acres may be disturbed over proposed duration of the CCAA, resulting in the disturbance or removal of vegetation from non-participant activities including vegetation clearing, grading, use of heavy machinery, construction of facilities, excavation, mining, application of caliche or other materials onto the surface, and application of herbicide to vegetation. As described in Section 4.3, the removal of vegetation would indirectly subject soils to increased wind erosion, leading to the loss of soils, particularly the fine sandy particulates (Machenberg 1984; Muhs and Holliday 1995, 2001; NRCS 2020).

As described in Section 3.4, vegetation within the Covered Area was historically threatened by overgrazing (Peterson and Boyd 1998). Under the No Action Alternative, participants of the TCP would implement conservation measures to minimize impacts to vegetation from grazing, brush management, fence, water facilities and windmill construction and maintenance (Service *et al.* 2011). However, non-participants in the TCP would not be subject to the implementation of conservation measures activities to reduce potential impacts to vegetation.

Under the No Action Alternative, conservation measures are discretionary, and impacts to vegetation from sectors not covered in the TCP or from non-participants not interested in enrolling in the TCP would continue at current levels. Surface disturbance from participants enrolled in the TCP would be limited (up to 2,125 acres). Participants in the TCP would implement voluntary conservation measures including avoidance and reestablishment of vegetation. However, surface disturbance from non-participants of the TCP would continue to occur without conservation measures to avoid or minimize the disturbance or removal of vegetation, and the overall viability of plant communities may be degraded. As a result, the No Action Alternative would likely result in short- to long-term, minor to moderate impacts and minor short-term, localized benefits due the limited take authorization for the TCP lack participants.

## **4.6 Wildlife**

### **4.6.1 Alternative A – Proposed Action**

As part of the Proposed Action, the Conservation Measures (*see* Section 2.1.4) would avoid or minimize surface disturbances within the Covered Area. Setting a limit on development activities within the Covered Area would minimize the loss of habitat present in the Covered Area by limiting and offsetting surface disturbance, thus benefitting the local wildlife that utilize habitat that overlaps DSL habitat.

By relocating or concentrating development activities outside of DSL habitat within the Covered Area and onto adjacent lands where wildlife may occupy suitable habitat, some habitats may be disturbed or changed and some species may be displaced or avoid the area. Displacement of wildlife species individuals would potentially force the wildlife into competition with residents of adjacent habitat for available resources. This displacement could produce short-term changes in localized species composition (Adams and Geis 1981) or lead to reduced physical condition and health of affected individuals.

Habitat disturbance or changes would be reduced and minimized in the Covered Area under the Proposed Action, thereby preserving other species habitat in areas that overlap DSL habitat. However, activities in adjacent areas may lead to habitat disturbance or change, or displacement, avoidance, injury or mortality of wildlife species. It is anticipated that wildlife would avoid disturbed areas during construction or other noise-producing activities. Once activities have ceased, wildlife would return to the area, if habitat for these species still exists. As a result, the Proposed Action would result in short- and long-term due to modification of the landscape and vegetation, minor to moderate impacts; and minor, short- to long-term benefits to wildlife, depending on the participation level and amount of impact avoidance and minimization implemented.



#### **4.6.2      *Alternative B – No Action Alternative***

Under the No Action Alternative, voluntary conservation measures would continue under the TCP (Service *et al.* 2011) and other conservation programs (such as NRCS) to avoid and minimize potential impacts to wildlife habitat. However, surface disturbance by non-participants in these programs within the Covered Area would not be subject to additional conservation measures to minimize or avoid impacts to wildlife habitat. Under the No Action Alternative, conservation measures outside those defined in the TCP are discretionary and impacts to vegetation from sectors not covered in the TCP or other conservation programs, or from non-participants not interested in enrolling in these programs would continue at current levels. Surface disturbance from participants enrolled in the TCP would be limited (up to 2,125 acres). However, surface disturbance from non-participants of the TCP would continue to occur without conservation measures to avoid or minimize the disturbance or removal of vegetation. As a result, the No Action Alternative would result in short- to long-term, minor to moderate impacts similar to the Action Alternative, and minor, short- to long-term, benefits due to the disturbance limits under the TCP for its participants.

### **4.7      Listed, Proposed, and Candidate Species Not Covered**

#### **4.7.1      *Alternative A – Proposed Action***

No Federally listed or proposed species (other than the Covered Species) have the potential to be present in the Covered Area, and there is no designated or proposed critical habitat in the Covered Area. As a result, the Proposed Action would have no impact and no effect on these resources. Of the State-listed, proposed, and candidate species, the Texas State-listed Dune Umbrella Sedge and Texas Horned Lizard were identified to have potential presence within the Covered Area (see Chapter 3.6).

Conservation Measures implemented under the Proposed Action would avoid or minimize new development and surface disturbances within the Covered Area. By limiting new surface disturbances within the Covered Area, changes would be avoided or minimized to potential habitat for any Dune Umbrella Sedge plants or Texas Horned Lizards. Setting a cap on development activities within the Covered Area would encourage the preservation of open grassland habitats utilized by the Texas Horned Lizard and limit disturbances to blowouts within sand dunes used by the Dune Umbrella Sedge. However, by limiting surface disturbances within the Covered Area, and by moving development activities out of DSL habitat within the Covered Area, this may move activities into adjacent suitable habitat. Any potential impacts to habitats of State-listed, proposed, and candidate species would be minimized or avoided in compliance with Texas State law. As a result, the Proposed Action would have no impact on listed, proposed, or candidate species, and avoidance or limits to surface disturbance as part of Conservation Measures would provide short- to long-term benefits to these species by minimizing the threat of habitat loss. Given these findings, the Proposed Action would not result in significant impacts to non-covered listed, proposed, or candidate species.

#### **4.7.2      *Alternative B – No Action Alternative***

Under the No Action Alternative, voluntary conservation measures would continue under the TCP (Service *et al.* 2011) to avoid and minimize potential impacts to listed, proposed or candidate species (other than the Covered Species). However, surface disturbance by non-participants in the TCP within the Covered Area would not be subject to additional conservation measures to minimize or avoid impacts to the habitat of these species. Under the No Action Alternative, conservation measures outside those defined in the TCP are discretionary and impacts to habitat from sectors not covered in the TCP or from

participants not interested in enrolling in the TCP would continue at current levels. Any potential impacts to habitats of State-listed, proposed, and candidate species would be minimized or avoided in compliance with Texas State law.

If the Covered Species becomes Federally listed under the ESA and the Applicant and each potential Participant seek individual ITPs, for which DSL Habitat is used as a surrogate for incidental take, mitigation and avoidance measures may be implemented for listed species. However, these would be implemented on a project-by-project basis and only for areas of each project where a reasonable likelihood of take could not be avoided. As a result, the No Action Alternative would result in short- to long-term, minor to moderate impacts and short- to long-term benefits.

## **4.8 Land Use and Ownership**

### **4.8.1 *Alternative A – Proposed Action***

Land ownership would not change as a result of the Proposed Action. Under the Proposed Action, development associated with certain Covered Activities would be restricted or precluded in areas of High and Intermediate Suitability DSL Habitat, subject to certain exceptions, as part of implemented Conservation Measures. Overall new surface disturbance by sand mining operations of DSL Habitat in the Covered Area would be limited to 60 acres annually and would not exceed 1,380 acres over the duration of Permit and 2020 DSL CCAA term. The use of existing developed areas and ROW for developing infrastructure would be encouraged, and the footprint for development would be minimized. Utilizing existing developed areas would also allow more efficiencies during development activities because less new area and infrastructure would need to be developed. As a result, restrictions or changes to existing land uses would be temporary and localized. Any temporary restrictions or closures to land uses, including recreation opportunities, would be coordinated as appropriate with those landowners and applicable management agencies.

Where new development is necessary to accommodate permanent infrastructure, the Participants would comply with existing zoning regulations and applicable land use plans and avoid, to the extent possible, any permanent conversion of existing land uses. Where permanent conversion of existing land uses is necessary, the Proposed Action would comply with permit allowances and applicable land use policies or regulations. Temporary and permanent changes to land use may result in delays for obtaining permits or leases due to additional agency involvement and expanded necessary approvals. Therefore, under the Proposed Action, impacts on land use and ownership would be short- to long-term and minor to moderate.

Non-Participant mineral development on Enrolled Properties, or “stratification,” could lead to the diminishment of benefits or improvements of Conservation Measures implemented under the 2020 DSL CCAA. However, as part of the 2020 DSL CCAA, non-Participants sharing access to the same surface estate as Participants would be encouraged to become Participants. For severed properties, surface and mineral estate owners would collaborate to develop approaches to development that avoid, minimize, or offset impacts from development. These approaches may include cooperation to minimize new disturbances through the use of an existing or shared right-of-way or developing surface use or mineral management plans. As a result, the implementation of Conservation Measures under the Proposed Action by the Applicant may contribute to the reduction in occurrence and intensity of stratification, thereby resulting in short- to long-term benefits related to land use.

#### **4.8.2      *Alternative B – No Action Alternative***

Land ownership frequently changes as a result of population and development growth and is expected to continue to change under the No Action Alternative. Under the No Action Alternative, developers would continue their operations without limitation for purposes of DSL conservation. Development associated with the Covered Activities would not be restricted or precluded by Conservation Measures under the 2020 DSL CCAA. Restrictions to development would occur through other regulatory mechanisms (e.g., permits) and developers may choose to pursue other voluntary conservation programs. The extent and duration of development on new surfaces may result in temporary or permanent and localized or widespread changes or restrictions to land use, depending on the activity. Permanent conversion of existing land uses under the No Action Alternative may occur but would be limited to the extent allowed by the responsible agency and in accordance with applicable land use policies or regulations. Temporary and permanent changes to land use may result in delays for obtaining permits or leases due to additional agency involvement and expanded necessary approvals. As a result, impacts on land use and ownership under the No Action Alternative would be short- to long-term and minor to moderate.

Under the No Action Alternative, there would not be the implementation of Conservation Measures that encourage or incentivize non-Participants to become Participants or to cooperate with Participants. As a result, stratification of lands within the Covered Area would continue, and there would be no cooperation between split estate surface and mineral owners or lessees to minimize new disturbances or develop approaches to development that avoid, minimize, or offset impacts from development on severed properties. The benefits provided under the Proposed Action related to addressing stratification issues would not be experienced under the No Action Alternative.

### **4.9      Cultural Resources**

#### **4.9.1      *Alternative A – Proposed Action***

The Proposed Action would entail avoidance, minimization, and offset of disturbance of the Covered Area, and by extension, minimization of harm to Covered Species via the voluntary implementation of Conservation Measures (*see* Section 2.1.4). The issuance of the Permit and approval of a CCAA constitutes an undertaking using the definition found in 36 CFR 800.16(y) of the implementing regulations of the NHPA. However, the undertaking is limited to the evaluation of the efficacy, legality, suitability of the CCAA and permitting of the incidental take of the Covered Species, should the species be listed in the future. The underlying commercial, industrial and other sector activities, including oil and gas development and sand mining are not authorized by the Proposed Action and do not require a federal approval. Additionally, no historic structures or cemeteries have been recorded in the vicinity, and no NRHP individual properties or districts have been recorded within, or within 1 mile of, the Covered Area. Finally, the Covered Species is not eligible for listing in the NRHP, as it is not a site, building, structure, or object (54 USC 300308). Thus, the Proposed Action has no potential to affect historic properties. Given these findings, the Proposed Action will have no effect on cultural resources.

#### **4.9.2      *Alternative B – No Action Alternative***

Under the No Action Alternative, the Service would not approve the Permit. Thus, the Proposed Action has no potential to affect historic properties. Given these findings, the Proposed Action will have no effect on cultural resources.

## 4.10 Cumulative Impacts

This analysis also considers potential impacts on resources from the 2020 DSL CCAA, when combined with other past, present, and reasonably foreseeable actions in the Covered Area. Reasonably foreseeable actions include planned or funded future actions that are reasonably certain to occur or continue occurring over the requested Permit term. These include reasonably foreseeable projects that would result in cumulative impacts as defined under the 1978 NEPA regulations (40 CFR 1508.7) under which this evaluation is being conducted.

The primary past, present, and reasonably foreseeable actions in the Covered Area are the aforementioned Covered Activities (*see* Table 1). These actions, and their associated potential impacts, are anticipated to continue to occur regardless of this 2020 DSL CCAA. Other reasonably foreseeable actions not associated with the Covered Activities were identified through review of existing and approved statewide strategic plans; local and regional land use plans; government websites and geographic information system (GIS) data; county-level transportation plans; county-level water management plans; and regional conservation management plans. These include implementation of goals, objectives, and guidance to support agriculture and overall future growth and development; construction and operation of transmission pipelines and oil and gas wells; construction, maintenance and operation of electric powerlines; upgrades to and expansions of existing roadway infrastructure; renewable energy development; and new and expanded water resource infrastructure to meet irrigation demands and address water shortages. These actions and projects are described in Table 8.

**Table 8. Reasonably Foreseeable Projects in the Covered Area**

Topic/Focus Area	Project/Plan Name	Location	Description
Covered Species	<i>Texas Conservation Plan</i> <i>Conservation for the Dunes Sagebrush Lizard</i> (TCP)	All Covered Area Counties	Voluntary conservation program that incentivizes private landowner participation through avoidance of DSL Habitat and the funding and implementation of Conservation Measures. The existing TCP Covered Area overlaps with the Covered Area of the 2020 DSL CCAA and includes activities associated with oil and gas and agriculture and ranching but does not establish specific conservation measures for sand mining and renewable energy operations.
Agriculture	Texas Department of Agriculture Strategic Plan (2019–2023)	Statewide	Establishes goals, objectives, and performance measures to generate marketing opportunities for Texas agriculture and increase funding/assistance to rural communities and businesses.
Land Use/Economic Development	Odessa Comprehensive Plan	Ector County	Provides guidance for future growth, development, land use, infrastructure, and services in Odessa. Identifies needed redevelopment areas, updated roadway standards and zoning ordinances.
Land Use/Economic Development	2013 City of Andrews Comprehensive Plan	Andrews County	Estimates that residential land use would comprise the largest land use, with an estimated 1-3% annual population growth, as well as commercial uses due to oil and gas activities in the Permian Basin.
Pipelines, Oil and Gas	The Texas Railroad Commission Public GIS Viewer	All Covered Area Counties	Transmission pipelines and oil and gas wells are located extensively throughout Andrews, Crane, Ector, Gaines, Ward, and Winkler Counties. The U.S. Energy Information Administration (EIA, 2020) notes that Texas continues to lead the nation in crude oil and natural gas production, and is among the top 10 coal producers. This trend, along with associated pipeline and well development, is anticipated to continue into the future.

Topic/Focus Area	Project/Plan Name	Location	Description
Renewable Energy	U.S. Energy Information Administration's U.S. Energy Mapping System	All Covered Area Counties	The EIA's mapping database shows 350 megawatts solar and 189 megawatts of wind energy present across the Covered Area. The EIA (2020) also notes that Texas leads the nation in wind-powered electricity generation and "western part of the state give Texas some of the greatest solar power potential in the nation." Due to decreasing costs and improved transmission access, this trend of increasing renewable energy development is anticipated to continue into the future.
Roads and Transportation	Texas Department of Transportation	All Covered Area Counties	<p>As of 2020, the Texas Department of Transportation has identified the following projects as underway, scheduled, or planned for construction with the purposes of traffic signal installation or repair; roadway resurfacing, repair or widening; or bridge replacement.</p> <ul style="list-style-type: none"> <li>Projects currently underway or scheduled for construction in the near future: 2 in Andrews County, 10 in Crane County, 9 in Ector County, 1 in Gaines County, and 2 in Winkler County</li> <li>Projects with plans of development in the next 10 years: 16 in Andrews County, 7 in Crane County, 74 in Ector County, 14 in Gaines County, 18 in Ward County, and 12 in Winkler County</li> <li>Projects involving corridor surveys and/or planned development in 10+ years: 5 in Andrews County, 2 in Ward County, and 3 in Winkler County</li> </ul>
Water Development	2017 Texas State Water Plan	All Covered Area Counties	<p>The Texas State Water Plan has identified the following projected water needs for 2020-2070 and recommended projects to address future water shortages.</p> <ul style="list-style-type: none"> <li>Andrews County: 40,417 acre-feet per year (af/y) predominantly attributed to irrigation demands; six projects including expansion of existing aquifer supplies, redirection of non-potable sources, and irrigation and mining conservation activities</li> <li>Crane County: No projected water needs; one mining conservation activity</li> <li>Ector County: 39,167 af/y predominantly attributed to increases in municipal use; seven projects including desalination and treatment of existing aquifer supplies, irrigation, steam electric power, and mining conservation activities, and expansion of well fields</li> <li>Gaines County: 273,146 af/y predominantly attributed to irrigation and power demands; nine projects including expansion of existing supplies, desalination and treatment of existing supplies, and agriculture conservation activities</li> <li>Ward County: 5,569 af/y predominantly attributed to irrigation demands; four projects including expansion of existing supplies, irrigation and mining conservation activities, and water auditing</li> <li>Winkler County: 421 af/y predominantly attributed to irrigation demands; four projects including expansion of existing supplies, irrigation and mining conservation activities, and water auditing</li> </ul>
Water Development	2015 Llano Estacado Underground Water Conservation District Management Plan	Gaines County	Predicts substantial decrease in annual water pumping from the years 2010 to 2060. For example, it is predicted that in 2020 Gaines County would pump approximately 240,110 af/y in the Ogallala Aquifer and 46,202 af/y from the Edwards-Trinity Aquifer, and by 2060 estimates decrease to an annual pumping rate of 71,544 af/y in the Ogallala and 12,904 af/y in the Edwards-Trinity.

Most of the Covered Area is privately owned and rural and unlikely to be subject to urban development or urban sprawl from existing cities and towns (*see* Figure 1). The road development projects listed in Table 8 would occur in and around cities and are not anticipated to result in reasonably foreseeable impacts to the Covered Species or on soils, vegetation communities, wildlife habitat within the Covered Area. Reasonably foreseeable water development projects would help address water supply shortages for irrigation, power demands and municipalities, and are intended to increase management and conservation of groundwater. Conservation of groundwater is anticipated to indirectly benefit the Covered Species over the long-term through water provision that would support vegetation and dune structures potentially inhabitable by the Covered Species.

Disturbance, loss, or removal of soils, vegetation, and wildlife habitat is an inevitable change from development activities. Many projects would also include restoration and reclamation activities for soils, vegetation, and wildlife habitat, in addition to the conservation of groundwater. Changes to habitat for listed, proposed, and candidate species or injury or mortality of these species would be subject to consultation with the Service, which would restrict any activity to a level that would avoid impacts to populations of listed, proposed, or candidate species. Changes to these resources would typically be limited to the area of disturbance or areas within the immediate vicinity. As a result, reasonably foreseeable projects could result in minor to moderate, short- to long-term impacts on soils, water, vegetation, wildlife, and listed, proposed, and candidate species, and short- to long-term, benefits to these resources.

During construction of these projects, land ownership may change, and restrictions or closures to existing land use would be implemented. Restrictions or closures to existing land uses associated with other reasonably foreseeable projects would be temporally and spatially limited to the extent possible; however, these restrictions or closures would still be anticipated. Depending on the size of the project, such as the construction of large-scale water supply and irrigation infrastructure, temporary restrictions or changes to land use may be widespread. Where new development is necessary to accommodate permanent infrastructure, other reasonably foreseeable projects would comply with existing zoning regulations and applicable land use plans and aim to minimize permanent conversions of land use to the extent possible. As a result, impacts on land use and ownership from other reasonably foreseeable projects would be short- to long-term and minor to moderate.

The implementation of reasonably foreseeable land use goals, objectives, and guidance would help manage and protect existing land uses. Depending on the needs of the community implementing new land use goals, objectives, or guidance, existing land uses may be aimed at conserving land uses, such as agricultural lands, or managing changes to land use necessary for supporting future growth and development. As a result, reasonably foreseeable projects would also provide short- to long-term benefits to land use.

Actions considered under the Proposed Action would result in a range of short- to long-term, negligible to moderate incremental impacts to Covered Species, hydrology and water resources, soils, vegetation, wildlife (general and special status), land use and ownership, and cultural resources beyond conditions described in the No Action Alternative. However, implementation of Conservation Measures in the Covered Area under the Proposed Action would also result in short- to long-term benefits to evaluated resources and offset adverse impacts associated with Covered Activities. Therefore, the Proposed Action, when combined with past, present, and reasonably foreseeable actions, would result in cumulative impacts similar to, but slightly reduced from, impacts described under the No Action alternative, due to the potential for the Proposed Action to provide additional short- to long-term benefits.

## 5 AGENCY CONSULTATION AND LIST OF PREPARERS

### 5.1 Agency Consultation

Agencies consulted during the preparation of this EA were as follows:

- U.S. Fish and Wildlife Service

### 5.2 List of Preparers

Table 9 provides a list of Service and consultant staff involved in the preparation of this EA.

**Table 9. List of Preparers**

Agency or Entity	Name	Role
U.S. Fish and Wildlife Service (Service), Austin Ecological Services Field Office	Tanya Sommer	Policy Reviewer
U.S. Fish and Wildlife Service (Service), Austin Ecological Services Field Office	Christina Williams	Policy Reviewer
U.S. Fish and Wildlife Service (Service), Ecological Services Regional Office	Marty Tuegel	Policy Reviewer
U.S. Fish and Wildlife Service (Service), Texas Coastal Ecological Services Field Office	AJ Vale	Technical Expert
SWCA Environmental Consultants (SWCA)	Amanda Aurora	SWCA Project Manager
SWCA	Sue Wilmot	NEPA QA/QC
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SWCA	Brittany Irle	NEPA Author
SWCA	Liz Hitzfelder	GIS
SWCA	Lauri Logan	Technical Editor

## 6 LITERATURE CITED

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- Advisory Council on Historic Preservation. 2019. "When Do Project Planning Activities Trigger a Section 106 Review." Available at: <https://www.achp.gov/digital-library-section-106-landing/when-do-project-planning-activities-trigger-section-106-review>. Accessed September 2020.
- Anaya, R., Boghici, R., French, L., Jones, I., Petrossian, R., Ridgeway, C., Shi, J., Wade, S., Weinberg, A. 2016. Texas Aquifers Study: Groundwater quantity, quality, flow, and contributions to surface water. Austin, Texas: Texas Water Development Board. A legislative report. Available at: [https://www.twdb.texas.gov/groundwater/docs/studies/TexasAquifersStudy\\_2016.pdf#page=135](https://www.twdb.texas.gov/groundwater/docs/studies/TexasAquifersStudy_2016.pdf#page=135). Accessed July 2020.
- Arthur, M. D. Saffer, P. Belmont. 2020. Types of Aquifer [online resource]. Pennsylvania State University. Available at: <https://www.e-education.psu.edu/earth111/node/911>. Accessed July 2020.
- Ashworth, J. 1990. Evaluation of ground-water resources in parts of Loving, Pecos, Reeves, Ward and Winkler Counties, Texas. Texas Water Development Board. Report 317. 57 pp. Available at: [https://www.twdb.texas.gov/publications/reports/numbered\\_reports/doc/R317/R317.pdf](https://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R317/R317.pdf) Accessed July 2020.
- Axtell, R.W. 1988. Interpretive atlas of Texas lizards. Southern Illinois University at Edwardsville. Edwardsville, Illinois.
- Black Mountain Sand. 2019. Black Mountain Sand Permian Basin Infographic. Available at: <https://www.blackmountainsand.com/texas-frac-sand-mines-of-bms-permian-basin-infographic/> Accessed September 2020.
- Bradley, R.G. and S. Kalaswad. 2003. The groundwater resources of the Dockum Aquifer in Texas. Texas Water Development Board. Report 359. 81 pp. Available at: [https://www.twdb.texas.gov/publications/reports/numbered\\_reports/doc/R359/Report%20359%20Dockum%20Final.pdf](https://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R359/Report%20359%20Dockum%20Final.pdf) Accessed July 2020.
- Brown, J.L., M.W. Collopy, E.J. Gott, P.W. Juergens, A. B. Montoya, and W.G. Hunt. 2006. *Wild-reared aplomado falcons survive and recruit at higher rates than hatched falcons in a common environment*. Biological Conservation 131(3): 453-458.
- Campbell, L. 2003. *Endangered and Threatened Animals of Texas—Their Life History and Management*. Texas Parks and Wildlife Department, Wildlife Division. Austin, Texas. 129 pp.
- Center for Biological Diversity and Defenders of Wildlife. 2018. Petition to List the Dunes Sagebrush Lizard as a Threatened or Endangered Species and Designate Critical Habitat. Tuscon, Arizona and Washington, D.C. Petition submitted to the US Fish and Wildlife Service May 8, 2018.
- Davis, W.J. 2013. Shin-oak (*Quercus havardii*, Rydb.; Fagaceae) rhizome shoot production: possibilities for use in restoration. Master's Thesis. Department of Wildlife, Aquatic, and Wildland Science and Management, Texas Tech University, Lubbock, Texas.
- Chan, L.M. Painter, C.W., Hill, M.T., Hibbitts, T.J., Leavitt, D.J., Ryberg, W.A., Walkup, D. and Fitzgerald, L.A. 2020. Phylogeographic structure of the dunes sagebrush lizard, an endemic habitat specialist. PloS one 15 (9), e0238194. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0238194>



- Degenhardt, W.G. and K.L. Jones. 1972. A new sagebrush lizard, *Sceloporus graciosus*, from New Mexico and Texas. *Herpetologica* 28(3): 212-217.
- Dzialak, M.R., Houchen, D.J., Harju, S.M., Mudd, J.P., Wondzell, J.J., Webb, S.L., Gould, N.P., Hess, J.E. and J.B. Winstead. 2013. Exosystem-level dynamics of soil-vegetation features, with implications for conserving a narrowly endemic reptile. *Landscape Ecology* 28: 1371-1385.
- eBird. 2020. Sightings map of lesser prairie-chicken available through All About Birds [database]. Available at: [https://www.allaboutbirds.org/guide/Lesser\\_Prairie-Chicken/maps-sightings](https://www.allaboutbirds.org/guide/Lesser_Prairie-Chicken/maps-sightings) Accessed June 2020.
- Elliot, L. 2014. Descriptions of systems, mapping subsystems, and vegetation types for Texas. Available at: [https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/emst/texasecologicalsystemsdescriptions\\_2016.pdf](https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/emst/texasecologicalsystemsdescriptions_2016.pdf) Accessed June 2020.
- Environmental Protection Agency (EPA). 2020. Environmental Justice Screening and Mapping Tool. Available at: <https://ejscreen.epa.gov/mapper/index.html?wherestr=texas>. Accessed September, 2020.
- Fitzgerald, L.A., Sears, M.W., and C.W. Painter. 2005. Interdune dispersal of sand dune lizards (*Sceloporus arenicolus*) in the Mescalero sands ecosystem. Report to New Mexico Department of Game and Fish. 13 pp.
- Fitzgerald, L.A, Painter, C.W., Hibbitts, T.J., Ryberg, T.J., and N. Smolensky. 2011. The range and distribution of *Sceloporus arenicolus* in Texas: results of surveys conducted 8-15 June 2011. Final report to Institute of Renewable Natural Resources, Texas A&M University for the Texas Comptroller's Office. 38 pp.
- Fitzgerald, L.A., Painter, C.W., Sias, D.S., and H.L. Snell. 1997. The range, distribution, and habitat of *Sceloporus arenicolus* in New Mexico. Final report to New Mexico Department of Game and Fish. Contract #80-516.6-01. 31 pp.
- Forstner, M.J., D. Neuharth, M. Kiehne, D. Foley III, T. Hardy, and J. Jensen. 2018. *West Texas -Sands Threats Analysis to the Dunes Sagebrush Lizard* (*Sceloporus arenicolus*). San Marcos, Texas: Texas State University System. Prepared for the Texas Comptroller of Public Accounts. 31pp.
- Griffith, G., Bryce, S., Omernik, J. and Rogers, A., 2007. Ecoregions of Texas. Austin, Texas: Texas Commission on Environmental Quality.
- Henderson, D. 2006. An introduction to the Mescalero Sands Ecosystem. Department of Wildlife and Fisheries Sciences, Texas A&M University. College Station, Texas. 42pp.
- Hill, M.T. and L.A. Fitzgerald. 2007. Radio telemetry and population monitoring of sand dune lizards (*Sceloporus arenicolus*) during the nesting season. Final report to New Mexico Department of Game and Fish. Santa Fe, New Mexico.
- Johnson, K., Horner, M., Muldavin, E., Neville, P., Neville, T., and J. Smith. 2016. Dunes sagebrush lizard habitat map and models, New Mexico. Natural Heritage New Mexico Publ. No. 15-387. Natural Heritage New Mexico, University of New Mexico, Albuquerque, New Mexico.
- Hardy, T., Jensen, J., and Forstner, M. Texas State University System. 2018. Alpha Texas Dunes Sagebrush Lizard (*Sceloporus arenicolus*) Habitat Model, 47pp.

- Hibbitts, T.J., Ryberg, W.A., Adams, C.S., Fields, A.M., Lay, D., and M.E. Young. 2013. Microhabitat selection by habitat specialist and generalist in both fragmented and unfragmented landscapes. *Herpetological Conservation and Biology* 8(1): 104-113.
- Laurencio, D., Laurencio, L., and L.A. Fitzgerald. 2007. Geographic distribution and habitat suitability of the sand dune lizard (*Sceloporus arenicolus*) in Texas. Texas Cooperative Wildlife Collection, Department of Wildlife and Fisheries Sciences, College Station, Texas. 14 pp.
- Mace, R.E. 2019. *Sand Facilities and Their Potential Effects on the Groundwater Resources of the Monahans-Mescalero Sand Ecosystem, Permian Basin, Texas*. Texas State University: San Marcos, Texas. Report submitted to the Comptroller of Public Accounts.
- Machenberg, M.D. 1984. Geology of Monahans Sandhills State Park, Texas. Bureau of Economic Geology. The University of Texas at Austin. Austin, Texas. 49 pp.
- Muhs, D.R. and V.T. Holliday. 1995. Evidence of active dune sand on the Great Plains in the 19th century from the accounts of early explorers: *Quaternary Research* 43(2): 198-208.
- Muhs, D.R. and V.T. Holliday. 2001. Origin of late Quaternary dune fields on the southern high plains of Texas and New Mexico. *Geologic Society of America Bulletin* 113(1):75-87.
- National Agricultural Statistics Service. 2017. 2017 Census Volume 1, Chapter 2: County Level Data. Texas. Table 1. County Summary Highlights: 2017. United States Department of Agriculture. Available: [https://www.nass.usda.gov/Publications/AgCensus/2017/Full\\_Report/Volume\\_1,\\_Chapter\\_2\\_County\\_Level/Texas/](https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Texas/). Accessed June 28, 2020.
- National Park Service. 1997. *How to Apply the National Register Criteria for Evaluation*. National Register Bulletin 15. Washington, D.C.: National Park Service.
- Natural Resources Conservation Service. 1999. Soil survey of Loving and Winkler Counties, Texas. Available at: <https://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=TX> Accessed July 2020.
- Natural Resources Conservation Service. 2020a. Web Soil Survey [database]. Available at: <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>. Accessed June 2020.
- Natural Resources Conservation Service. 2020b. *Prosopis glandulosa* Torr. Honey mesquite. Plants Database. Available at: <https://plants.usda.gov/core/profile?symbol=PRGL2>. Accessed July 2020.
- New Mexico Department of Game and Fish. 2018. Dunes sagebrush lizard. Biota Information System of New Mexico [database]. Available at: <https://bison-m.org/booklet.aspx?SpeciesID=030086> Accessed June 2020.
- New Mexico Historic Preservation Division. 2020. *New Mexico Cultural Resource Information System (NMCRIIS) of the Archaeological Records Management System of the Historic Preservation Division*. Available at <https://nmcris.dca.state.nm.us/NMCRIIS/Security/SignIn.aspx>. Accessed June 2020.
- Painter, C.W. and D.S. Sias. 1998. *Sceloporus arenicolus* (dunes sagebrush lizard). *Herpetological review* 29(1): 52

- Parker, P.L., and T.F. King. 1998. *Guidelines for Evaluating and Documenting Traditional Cultural Properties*. National Register Bulletin 38. Washington, D.C.: National Park Service.
- Peterson, R.S. and C.S. Boyd. 1998. Ecology and management of sand shinnery communities: a literature review. U.S. Dept. of Agriculture. U.S. Forest Service, Rocky Mountain Research Station. Ft. Collins, Colorado. 44 pp.
- Ryberg, W.A., Hill, M.T., Painter, C.W., and L.A. Fitzgerald. 2013. Landscape pattern determines neighborhood size and structure within a lizard population. *PLoS ONE* 8(2): e56856.
- Randklev, C.R. N.A. Johnson, T. Miller, J.M. Morton, J. Dudding, K. Skow, B. Boseman, M. Hart, E.T. Tsakiris, and R.R. Lopez. 2017. *Freshwater Mussels (Unionidae): Central and West Texas Final Report*. Texas A&M Institute of Renewable Natural resources, College Station, Texas.
- Ryberg, W.A., Hill, M.T., Painter, C.W., and L.A. Fitzgerald. 2015. Linking irreplaceable landforms in a self-organizing landscape to sensitivity of population vital rates for an ecological specialist. *Conservation Biology* 29(3):888-898.
- Sena, A.P. 1985. The Distribution and Reproductive Ecology of *Sceloporus graciosus arenicolus* in Southeastern New Mexico. Final Draft of a Ph. D. dissertation submitted to the University of New Mexico, Albuquerque.
- Smolensky, N. and L.A. Fitzgerald. 2010. Distance sampling underestimates population densities of dune dwelling lizards. *J. Herpetology* 44: 372-381.
- Sias, D.S., and H.L. Snell. 1998. The Sand dune lizard *Sceloporus arenicolus* and oil and gas development in southeastern New Mexico. Final report of field studies 1995-1997. Endangered Species Program New Mexico Department of Game and Fish. 90 pp
- Snell, H.L., Gorum, L.W., Pierce, L.J.S., and K.W. Ward. 1997. Results from the fifth year (1995) research on the effect of shinnery oak removal on populations of sand dune lizards, *Sceloporus arenicolus*, in New Mexico. Final report to New Mexico Department of Game and Fish. Contract #80-516.6-01. 13 pp.
- (Texas A&M University) Ryberg, W., Walkup, D., Young, M., Fitzgerald, L., and T. Hibbitts. 2016. Best practices for managing dunes sagebrush lizards in Texas. Texas A&M University Institute of Renewable Natural Resources, Department of Wildlife and Fisheries Sciences, Biodiversity Research and Teaching Collections. College Station, Texas.
- Texas Comptroller of Public Accounts. 2020. Candidate conservation agreement with assurances for the dunes sagebrush lizard. Available at: <https://comptroller.texas.gov/programs/natural-resources/dslccaa/>. Accessed June 2020.
- Texas Comptroller of Public Accounts. 2020. Draft Internal Impact Calculations. Texas Comptroller's Office. E-mail, 1/23/2020.
- Texas Historical Commission. 2020. *Texas Archeological Sites Atlas*. Available at: <https://atlas.thc.texas.gov/>. Accessed June 2020.
- Texas Parks and Wildlife Department (TPWD). 2020a. Texas ecoregions. Available at: <https://tpwd.texas.gov/education/hunter-education/online-course/wildlife-conservation/texas-ecoregions> Accessed June 2020.

- Texas Parks and Wildlife Department (TPWD). 2020b. Monahans Sandhills State Park. Available: <https://tpwd.texas.gov/state-parks/monahans-sandhills>. Accessed June 2020.
- Texas Parks and Wildlife Department (TPWD). 2020c. Texas Ecosystems Analytical Mapper. Available at: <https://tpwd.texas.gov/gis/team/#> Accessed June 2020.
- Texas Parks and Wildlife Department (TPWD). 2020d. Rare, Threatened, and Endangered Species of Texas. Available at: <https://tpwd.texas.gov/gis/rtest/>. Accessed June 2020.
- Texas Water Development Board (TWDB). 2020a. Dockum Aquifers. Available at: <https://www.twdb.texas.gov/groundwater/aquifer/minors/dockum.asp>. Accessed July 2020.
- Texas Water Development Board (TWDB). 2020b. Pecos Valley Aquifer. Available at: <https://www.twdb.texas.gov/groundwater/aquifer/majors/pecos-valley.asp>. Accessed July 2020.
- U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, and Center of Excellence for Hazardous Materials Management. 2008. Candidate Conservation Agreement for the lesser prairie-chicken (*Tympanuchus pallidicinctus*) and sand dune lizard (*Sceloporus arenicolus*) in New Mexico. Albuquerque, New Mexico. December 8, 2008.
- U.S. Energy Information Administration (EIA). 2020. Texas state profile and energy estimates. Available at: <https://www.eia.gov/state/analysis.php?sid=TX>. Accessed September, 2020.
- U.S. Fish and Wildlife Service, Natural Resources Conservation Service, Texas A&M University, Texas Comptroller of Public Accounts, Texas Endangered Species Task Force, *et al.* 2011. Texas Conservation Plan for the dunes sagebrush lizard (*Sceloporus arenicolus*). Albuquerque, New Mexico. September 27, 2011.
- U.S. Fish and Wildlife Service. 2020. Information for Planning and Consulting. Available at: <https://ecos.fws.gov/ipac/>. Accessed June 2020.
- University Lands. 2020. About University Lands. Available: <http://universitylands.utsystem.edu/Home/AboutUs>. Accessed June 26, 2020.
- Walkup, D.K., Leavitt, D.J., and L.A. Fitzgerald. 2017. Effects of habitat fragmentation on population structure of dune-dwelling lizards. *Ecosphere* 8: 1-15.
- Walkup, D. K., Ryberg, W. A., Fitzgerald, L., & Hibbitts, T. J. 2018. Occupancy and Detection of an Endemic Habitat Specialist, the Dunes Sagebrush Lizard (*Sceloporus arenicolus*). *Herpetological Conservation and Biology* 13(3), 497-506.
- Walkup, D. K., Ryberg, W. A., Fitzgerald, L. A., & Hibbitts, T. J. 2019. From the ground up: microhabitat use within a landscape context frames the spatiotemporal scale of settlement and vacancy dynamics in an endemic habitat specialist. *Landscape Ecology*, 34(11), 2631-2647.
- Wiken *et al.* 2011.
- Young, M.E., Ryberg, W.A., Fitzgerald, L.A., and T.J. Hibbitts. 2018. Fragmentation alters home range and movements of the Dunes Sagebrush Lizard. *Canadian Journal of Zoology* 96(8):905-912.