# U.S. Fish & Wildlife Service

# Recovery Outline for the Dunes Sagebrush Lizard (*Sceloporus arenicolus*)



Photo Credit: USFWS

Species Name: Sceloporus arenicolus, dunes sagebrush lizard

Species Range: New Mexico and Texas, USA

**Recovery Priority Number:** 2C; explanation provided below

Listing Status: Endangered; May 20, 2024

Lead Regional Office/Cooperating Regional Office(s): Southwest Region (Region 2) Lead Field Office/Cooperating Field Office(s):

New Mexico Ecological Services Field Office (lead) Austin Ecological Services Field Office (cooperating)

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#### Background:

This recovery outline provides an interim strategy to guide the conservation and recovery of the dunes sagebrush lizard until draft and final recovery plans are completed. The U.S. Fish and Wildlife Service (USFWS) listed the dunes sagebrush lizard as endangered under the Endangered Species Act (ESA) of 1973, as amended, on May 20, 2024 (89 FR 43748), with an effective listing date of June 20, 2024. The following includes a brief summary of the biology, life history, and ecology of the dunes sagebrush lizard. A comprehensive overview of the species' morphology, phenology, reproduction, life span, demographic trends, and habitat needs can be found in Chapter 2 of the Species Status Assessment (SSA) Report for the Dunes Sagebrush Lizard (*Sceloporus arenicolus*) (USFWS 2024). An electronic copy of the SSA report is available on the <u>ECOS webpage for the dunes sagebrush lizard</u>.

#### Type and Quality of Available Information to Date:

#### Important Information Gaps:

- The dunes sagebrush lizard is a habitat specialist, relying on the narrowly distributed shinnery oak sand dunes and supportive matrix of shinnery oak flats. Currently, there is no method to restore shinnery oak sand dunes, so once development degrades or removes habitat, it is considered lost in perpetuity for the species.
- Studies suggest that degraded habitat may be improved for dunes sagebrush lizards through the removal of infrastructure such as caliche roads and oil well pads; however, the extent to which lizards will use reclaimed habitat areas is not well understood.
- Populations of dunes sagebrush lizard are not uniformly distributed throughout available habitat, and there is no information on the relationships between habitat area or patch size and how these relate to dunes sagebrush lizard abundance or resiliency. Additionally, there is no information available on the relationship between the number and size of blowouts (bowl-shaped depressions in the sand dunes that are important for reproduction and other aspects of the species' life history) needed to support healthy populations of dunes sagebrush lizards.
- There is no range-wide population estimate for dunes sagebrush lizards, and existing estimates differ in survey protocol and intensity. A more uniform effort to determine a range-wide estimate of numbers of dunes sagebrush lizards and how those numbers change over time would be helpful to understand demographic trends of the species throughout the range.
- Climate change is expected to increase the severity and frequency of droughts throughout the range of the dunes sagebrush lizard. Studies on how climate change may affect shinnery oak growth and spread, honey mesquite encroachment, habitat quality, and dunes sagebrush lizard physiology could yield a better understanding of how these stressors may impact the current populations as well as unoccupied habitat and how natural resource managers might mitigate and/or minimize these stressors.

#### Treatment of Uncertainties:

Due to limited data, there is some uncertainty with our analyses in the dunes sagebrush lizard SSA. We therefore make assumptions based on the best available information, which are explicitly defined in the SSA.

## Brief Life History:

The dunes sagebrush lizard is a small, light brown spiny lizard (Degenhardt et al. 1996; Hibbitts and Hibbitts 2015). Females average 53.8 mm (2.12 in) in snout-to-vent length while males average 54.5 mm (2.15 in; Degenhardt et al. 1996). Dunes sagebrush lizards have a short lifespan of two to four years (Snell et al. 1997; Fitzgerald and Painter 2009). Lizards are active from April through October, with mating occurring from May to early July (Fitzgerald and Painter 2009; Hibbitts and Hibbitts 2015). They reproduce only once or twice per season, which is less than other Sceloporines (Snell et al. 1997; Ryberg et al. 2012). Clutch sizes average five eggs with a range from three to six, and eggs are laid underground in sand dunes dominated by shinnery oak (Hibbitts and Hibbitts 2015; Hill and Fitzgerald 2007; Ryberg et al. 2012). Nest chambers are constructed at the soil moisture horizon, and eggs are packed with moist sand from the surrounding substrate (Ryberg et al. 2012). Females may prefer sandy soils with large grain size composition and high moisture content (Ryberg et al. 2012), as these conditions may have properties that allow for adequate gas and water exchange between the eggs and the surrounding substrate (Snell et al. 1997). Hatchlings emerge approximately 30 days after the eggs are laid, between July and September (Ryberg et al. 2012; Fitzgerald and Painter 2009). Hatchlings grow rapidly and reach sexual maturity by the following spring or summer (Degenhardt and Jones 1972; Cole 1975; Fitzgerald and Painter 2009; Hibbitts and Hibbitts 2015). During the colder winter months between breeding seasons, lizards bury themselves underground and remain dormant (Sena 1985; Sartorius et al. 2002; Painter 2004; Ferguson et al. 2014).

## Limiting Life History Characteristics:

The dunes sagebrush lizard is a habitat specialist, relying on the shinnery oak sand dune ecosystem. The species is primarily associated with sand dune blowouts, and the distribution of dunes sagebrush lizards is related to sand grain size, with greater species abundance being tied to larger sand grain particles that can more easily facilitate the exchange of moisture and gases to buried lizards or eggs. Sand dune formations and associated blowouts shift over time, and dunes sagebrush lizard populations also follow these naturally shifting dynamics, such that the current state of occupancy at a site is not a reliable indicator of future occupancy. Sand dune formations are formed over long timescales (centuries to millennia), and currently, once disturbed, there are no methods for restoring the shinnery oak sand dunes.

# Primary Threats:

The primary factors affecting the current and future conditions of the dunes sagebrush lizard are habitat loss and fragmentation. The source of these stressors is primarily related to oil and gas extraction, associated infrastructure development, and frac sand mining (with frac sand used during hydraulic fracturing of oil and gas wells), which modify and degrade shinnery oak duneland and the surrounding shinnery oak supportive habitat to an extent that it is no longer suitable for dunes sagebrush lizard use. Additional sources of stressors include wind and solar development, transmission lines and other linear infrastructure, shinnery oak treatments, honey mesquite encroachment, grazing, and off-highway vehicle (OHV) use.

#### Current Biological Status of the Species:

#### Overview:

The dunes sagebrush lizard is found in the Mescalero and Monahans Sandhills of southeast New Mexico and west Texas (Figure 1). The species relies on the ancient sand dune fields that are maintained by wind and moving sand, embedded in a matrix of shinnery oak shrubland flats that stabilize the dunes. Dunes sagebrush lizards select habitat areas with open dune blowouts but will traverse shinnery oak flats, open dunes, and barren sand areas. Dunes sagebrush lizard habitat overlaps with the Permian Basin, a geologic province that hosts multiple basins, each with multiple stratigraphic units from which hydrocarbons, water, and/or minerals are extracted.



Figure 1. Range of the dunes sagebrush lizard in the Mescalero Sandhills of southeastern New Mexico and the Monahans Sandhills of west Texas, based on shinnery oak vegetative cover and suitable soils.

Our analysis of the current condition of the dunes sagebrush lizard in the SSA (USFWS 2024) was based on metrics indicative of the quality and quantity of habitat available for the species across 3 genetically distinct representation areas (Northern Mescalero, Southern Mescalero, and Monahans) that were further divided into 11 physically separated and genetically unique analysis units. The habitat-based approach equates habitat presence with species presence as an indirect measure of resiliency, providing an approach that is robust and consistent throughout the species' range. Dunes sagebrush lizard habitat was then further assessed in terms of disturbance and classified into categories of 'minimally disturbed', 'disturbed', or 'degraded.' Minimally disturbed areas are duneland and supportive habitat areas that are capable of supporting healthy populations of lizards, disturbed areas are currently supporting lizards but at reduced levels, and degraded areas may support lizards but are at high risk of localized extirpation. Across the 529,161 hectares (ha; 1.3 million acres) within the Mescalero and Monahans Sandhills, 96 percent (507,789 ha; 1.25 million acres) is classified as dunes sagebrush lizard habitat, with 40 percent (210,506 ha; 520,172 acres) classified as duneland and the remainder classified as supportive habitat. Of both duneland and supportive habitat types, 47 percent is minimally disturbed, 14 percent is disturbed, and 39 percent is degraded.

#### The 3 R's:

We define the dunes sagebrush lizard's viability as the ability of the species to sustain populations in the wild over time. Using the SSA framework, we describe the species' viability in terms of its resiliency, redundancy, and representation (collectively, the 3 R's).

The following provides a summary of our assessment of the current condition of the dunes sagebrush lizard from the SSA report (USFWS 2024).

<u>Resiliency</u> is defined as the ability of a population to withstand stochastic events (random fluctuations in demographic or environmental conditions). We can measure resiliency based on metrics of population health, for example birth versus death rates or population size. Each analysis unit within the three representation areas was given an overall condition score based on the proportion of each disturbance category within the unit. Two out of the eleven analysis units were given a score of 'high' for overall resiliency condition. Based on the size of these analysis units comparative to the total range, only six percent of the dunes sagebrush lizard range is in good enough condition to support robust, highly viable populations. Moderate condition areas are likely to continue supporting the species and are important for maintaining species viability long-term, but these areas suffer from potential local extirpations and reduced interconnectedness between habitat patches.

<u>Representation</u> is defined as the ability of a species to adapt to changing environmental conditions over time. Representation can be measured through the breadth of genetic or ecological diversity within and among populations across the species' range. We consider the dunes sagebrush lizard to have limited representation. While unique phylogenetic lineages are represented in the 11 analysis units, suggesting raw genetic variation present within the species to support adaptive capacity, some of the analysis units are in low condition, such that the entire phylogenetic lineage in these units is at risk of extirpation.

<u>Redundancy</u> is defined as the ability of a species to withstand catastrophic events (a rare and sudden destructive natural event or episode). Redundancy is about spreading the risk among populations or geographic areas and can be measured through the duplication and distribution of resilient populations across the range of the species. All the analysis units across the dunes sagebrush lizard range contain habitat classified as minimally disturbed and able to support healthy populations of the species. This

redundancy makes it less likely that any single catastrophe would eliminate the species, due to the size of the range. However, analysis units that are in low condition and vulnerable to extirpation are concentrated in the Southern Mescalero and Monahans, leaving the higher condition Northern Mescalero vulnerable.

#### Conservation Actions to Date:

The conservation efforts for the dunes sagebrush lizard have been largely state-specific to this point. In New Mexico, a team of local, State, and Federal officials, along with private and commercial stakeholders, published the Collaborative Conservation Strategies for the Lesser Prairie-Chicken and Sand Dune Lizard in New Mexico in August 2005. This document provided guidance in the development of the Bureau of Land Management's Special Status Species Resource Management Plan Amendment (RMPA) and the development of the Candidate Conservation Agreement (CCA) and Candidate Conservation Agreement with Assurances (CCAA) for the Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*) and the Sand Dune Lizard. The RMPA provides for specific conservation requirements and lease stipulations, and it has facilitated the removal of a large portion (>42,000 ha; 103,784 acres) of dunes sagebrush lizard habitat from future oil and gas leasing. The CCA and CCAA agreements focus on avoiding disturbance to duneland habitat and minimizing disturbances that cannot be avoided. The agreements also further conservation for the species by protecting and enhancing existing habitat and funding research studies.

In Texas, the Texas Conservation Plan (TCP) was established in 2012 to facilitate avoidance of dunes sagebrush lizard habitat. The plan was revised in 2020, along with the creation of another Candidate Conservation Agreement with Assurances (2020 CCAA), which included covering sand mining activities. For a more detailed description of each of these programs, refer to Chapter 4 of the SSA report (USFWS 2024).

#### Recovery Priority Number: 2C

The dunes sagebrush lizard is assigned a recovery priority number of 2C, indicating that this species has a high degree of threat and moderate potential for recovery. The threats to the species are high due to ongoing sources of habitat modification, primarily from oil and gas development, associated infrastructure, and frac sand mining. The recovery potential is moderate for the dunes sagebrush lizard because, while the threats are understood and the entire range of the species is under U.S. jurisdiction, conservation actions for the species have less certainty of removing, reducing, or mitigating the effects of impacts to duneland and supportive habitat. Restoration of dunes sagebrush lizard habitat is not currently feasible and will be novel or experimental but will be key to successful recovery of the species. Additionally, due to the economic importance of ongoing development in dunes sagebrush lizard habitat, the species is considered in conflict with these activities.

#### Interim Recovery Strategy:

The resiliency, representation, and redundancy of this species must be increased to ensure long-term viability of the dunes sagebrush lizard. To achieve this, the species needs multiple, resilient populations within its range that represent the breadth of genetic and ecological diversity (representation). The number of populations (redundancy) needed will depend on the population health (resiliency) of each population, as well as the extent of genetic and/or ecological diversity within the range determined to be

representative of the species. In the following Action Plan, we present an interim recovery strategy with seven components.

#### Action Plan:

1. Protect and expand extant populations of the dunes sagebrush lizard by maximizing the benefits of existing conservation programs on habitat and populations:

a. Work with stakeholders to strategically implement conservation actions to enhance existing dunes sagebrush lizard habitat.

b. Work with stakeholders to strategically implement conservation actions to protect duneland and supportive habitat and reduce habitat fragmentation.

c. Work with stakeholders to facilitate the increased protection and expansion of populations through existing conservation plans.

2. Protect and expand extant populations of dunes sagebrush lizard through minimizing adverse effects to habitat and populations:

a. Work with industry and agency partners to outline existing Endangered Species Act compliance options for future projects and develop additional options as necessary.

b. Work with industry and agency partners to collaborate early in the project planning process to understand potential impacts to dunes sagebrush lizards and explore options to fully avoid impacts or minimize and offset impacts where full avoidance is not possible.

c. Work with Federal action agencies to efficiently complete section 7 consultations such that impacts can be minimized and conservation needs incorporated into project implementation.

3. Protect, reclaim, and manage the quantity and quality of functional shinnery oak duneland habitat for the long-term survival of the dunes sagebrush lizard:

a. Improve dunes sagebrush lizard habitat through reclamation of abandoned infrastructure.

b. Improve dunes sagebrush lizard habitat with habitat-appropriate native vegetation, using locally sourced native seeds and vegetation when possible.

4. Reduce threats (e.g., oil and gas development, sand mining, linear infrastructure, etc.) to the dunes sagebrush lizard and its habitat:

a. Site new development outside of suitable dunes sagebrush lizard habitat, whenever possible, especially avoiding areas of high-quality shinnery oak duneland.

b. Minimize the footprint of development, i.e., size of a well site; centralized facilities; interim reclamation (reclaim portion of location after drilling and completion).

5. Survey and monitor for dunes sagebrush lizard:

a. Determine a standardized survey protocol and implement survey protocol trainings to increase the consistency of data collection throughout the species' range.

b. Develop long-term monitoring plans, study sites, and field methodology to be implemented across the species' range.

c. Work with partners to ensure that long-term monitoring data are comparable among and across all study sites.

d. Evaluate unoccupied suitable habitat to determine reasons for the lack of dunes sagebrush lizard occupation and assess whether parameters exist for potential reintroduction.

6. Conduct research to inform knowledge gaps and future conservation of the species:

a. Determine how and where to prioritize restoration of shinnery oak dunes and dune complexes.

b. Assess the efficacy of habitat reclamation (e.g., well pad, caliche roads, etc.) and dunes sagebrush lizard use of reclaimed surfaces.

c. Evaluate dunes sagebrush lizard ecology and habitat in the context of climate change, potentially including exploring bioclimatic envelopes and potential suitable habitat outside the current range of the species.

d. Improve the understanding of the species' habitat needs (e.g., sand grain size, microclimate, dune structure) and ecology (e.g., nesting locations, habitat use).

7. Augment existing and establish additional populations of dunes sagebrush lizards within the species' range:

a. Develop and implement propagation and reintroduction plans and techniques for the dunes sagebrush lizard at zoos and other locations, as appropriate.

b. Where possible, reintroduce the species within suitable habitat where currently extirpated to improve the species' redundancy and representation.

c. Develop translocation plans for lizard populations that become heavily isolated due to fragmentation and habitat degradation.

d. Create a biobank of all genetically unique lineages of the species.

#### Preliminary Steps for Recovery Planning:

We will prepare a recovery plan pursuant to section 4(f) of the ESA. The recovery plan will include objective, measurable criteria which, when met, may result in a determination that the species be removed from the Federal list of Endangered and Threatened Wildlife. Recovery criteria will address all threats meaningfully impacting the species. The recovery plan will include site-specific management actions as may be necessary for the conservation and survival of the species. Finally, the recovery plan will estimate the time and cost required to carry out those measures needed to achieve the goal of recovery and delisting for the dunes sagebrush lizard.

Plan preparation will be carried out by the New Mexico Ecological Services Field Office. The USFWS anticipates either writing the recovery plan or appointing a recovery team to help draft a recovery plan for the dunes sagebrush lizard. Individuals invited to be a part of the recovery team would be experts in herpetology, particularly dunes sagebrush lizard ecology, and capable of advising the USFWS on recovery population thresholds and other recovery criteria as well as important short and long-term management actions necessary to recover this species.

During the recovery planning process, input, comments, and review will be sought from multiple stakeholders across the current and historical species' range. These will include Federal and State agencies, Tribes, and academic and private entities. We will conduct peer review of and solicit public comments on a draft recovery plan.

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Signed:

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