State of California
Natural Resources Agency
Department of Fish and Wildlife

REPORT TO THE FISH AND GAME COMMISSION

EVALUATION OF THE PETITION FROM THE CENTER FOR BIOLOGICAL DIVERSITY TO LIST THE TEMBLOR LEGLESS LIZARD (*Anniella alexanderae*) AS THREATENED OR ENDANGERED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

Prepared by
California Department of Fish and Wildlife

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EXECUTIVE SUMMARY

The Center for Biological Diversity submitted a petition (Petition) to the Fish and Game Commission (Commission) to list the Temblor legless lizard (*Anniella alexanderae*) as threatened or endangered under the California Endangered Species Act (CESA; Fish and Game Code section 2050, *et seq*.) on November 18, 2021.

The Commission referred the Petition to the Department of Fish and Wildlife (Department) in accordance with Fish and Game Code section 2073 (Cal. Reg. Notice Register 2021, No. 50-Z, p. 1694). On January 18, 2022, the Department requested a 30-day extension to the 90-day petition evaluation period. The Commission approved the request at its meeting on February 17, 2022. Pursuant to Fish and Game Code section 2073.5 and California Code of Regulations, title 14, section 670.1, the Department prepared this evaluation report (Petition Evaluation) to evaluate the scientific information contained in the Petition and other relevant information possessed or received by the Department during the evaluation period.

After reviewing the Petition and other relevant information, the Department determined the Petition meets the requirement in Fish and Game Code section 2072.3 that it include sufficient scientific information that the petitioned action may be warranted. Specifically, the Department determined the following:

- *Abundance*. The Petition describes the limited known occurrences of the Temblor legless lizard at a limited number of localities and describes the difficulty in assessing abundance of the species but characterizes it as rare based on available information. Additional information available to the Department confirms that there are very few known detections of the species and suggests low abundance.
- *Population trend.* The Department is not aware of sufficient data on population abundance over time to estimate a population trend. The Petition provides information on habitat loss over time in the estimated range of the Temblor legless lizard and uses this as a proxy for population decline throughout its estimated historical range.
- *Range*. The Petition provides sufficient information that the Temblor legless lizard has a very small range, making its continued existence especially vulnerable to threats.
- *Distribution*. The Petition provides sufficient information that the known distribution of the Temblor legless lizard is very limited, occurring at only five known sites, making its continued existence especially vulnerable to threats.
- *Life history*. The Petition provides sufficient information regarding the life history of the Temblor legless lizard including breeding and foraging patterns.

- *Kind of habitat necessary for survival*. The Petition provides sufficient information regarding the habitat necessary for survival of the Temblor legless lizard.
- *Factors affecting the ability to survive and reproduce*. The Petition provides sufficient information regarding factors affecting the ability of the Temblor legless lizard to survive and reproduce, including oil and gas development, urbanization, industrial solar projects, climate change, and invasive species that result in habitat loss, degradation, and fragmentation.
- *Degree and immediacy of threat*. The Petition provides sufficient information detailing the degree and immediacy of threats to the Temblor legless lizard, which it characterizes as high due to widespread threats throughout the limited range and distribution of the species.
- *Impact of existing management efforts*. The Petition provides sufficient information regarding the impact of existing management efforts. It describes a variety of regulatory mechanisms that could provide protection for the Temblor legless lizard but argues that they have been inadequate to date.
- *Suggestions for future management*. The Petition provides suggestions for future management actions for the Temblor legless lizard and its habitat including stopping new oil and gas development in its range and phasing out existing oil and gas development, initiating habitat protections, climate action, and reducing invasive species.
- *Availability and sources of information*. The Petition provides sufficient sources of information and has made them available to the Department along with the Petition.
- *Detailed distribution map*. The Petition provides a distribution map for the Temblor legless lizard.

In completing its Petition Evaluation, the Department has determined that while the Petition provides limited information on abundance and population trend due to few available observations of the species, the information provided on the species' small range and limited distribution, low number of detections, habitat loss, and other threats provides sufficient scientific information to indicate that the petitioned action to list the Temblor legless lizard as threatened or endangered under CESA may be warranted. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.

INTRODUCTION

Candidacy Evaluation

The Commission has the authority to list a native "species" or "subspecies" as threatened or endangered under CESA. (Fish & G. Code, §§ 2062, 2067, 2070.) The listing process is the same for species and subspecies. (Fish & G. Code, §§ 2070-2079.1.)

CESA sets forth a two-step process for listing a species as threatened or endangered. First, the Commission determines whether to designate a species as a candidate for listing by evaluating whether the petition provides "sufficient information to indicate that the petitioned action may be warranted." (Fish & G. Code, § 2074.2, subd. (e)(2).) If the petition is accepted for consideration, the second step requires the Department to produce, within 12 months of the Commission's acceptance of the petition, a peer reviewed report, based upon the best scientific information available to the Department, that indicates whether the petitioned action is warranted. (Fish & G. Code, § 2074.6.) Finally, the Commission, based on that report and other information in the administrative record, determines whether the petitioned action to list the species as threatened or endangered is warranted. (Fish & G. Code, § 2075.5.)

A petition to list a species under CESA must include "information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant." (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1).)

Within ten days of receipt of a petition, the Commission must refer the petition to the Department for evaluation. (Fish & G. Code, § 2073.) The Commission must also publish notice of the receipt of a petition in the California Regulatory Notice Register. (Fish & G. Code, § 2073.3.) Within 90 days of receipt of the Petition (or 120 days if the Commission grants an extension), the Department must evaluate the petition on its face and in relation to other relevant information the Department possesses or receives and must submit a written evaluation report to the Commission with one of the following recommendations:

- Based upon the information contained in the petition, there is not sufficient information to indicate that the petitioned action may be warranted, and the petition should be rejected; or
- Based upon the information contained in the petition, there is sufficient information to indicate that the petitioned action may be warranted, and the petition should be accepted and considered.

(Fish & G. Code, § 2073.5, subds. (a)-(b).) The Department's candidacy recommendation to the Commission is based on an evaluation of whether the petition provides sufficient scientific information relevant to the petition components set forth in Fish and Game Code section 2072.3 and the California Code of Regulations, Title 14, Section 670.1, subdivision (d)(1).

In *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal.App.4th 597, the California Court of Appeals addressed the parameters of the Commission's determination of whether a petitioned action should be accepted for consideration pursuant to Fish and Game Code section 2074.2, subdivision (e), resulting in the species being listed as a candidate species. The court began its discussion by describing the standard for accepting a petition for consideration previously set forth in *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal.App.4th 1104:

> As we explained in *Natural Resources Defense Council*, "the term 'sufficient information' in section 2074.2 means that amount of information, when considered with the Department's written report and the comments received, that would lead a reasonable person to conclude the petitioned action may be warranted." The phrase "may be warranted" "is appropriately characterized as a 'substantial possibility that listing could occur.'" "Substantial possibility," in turn, means something more than the one-sided "reasonable possibility" test for an environmental impact report but does not require that listing be more likely than not.

(*Center for Biological Diversity*, *supra*, 166 Cal.App.4th at pp. 609-10 [internal citations omitted].) The court acknowledged that "the Commission is the finder of fact in the first instance in evaluating the information in the record." (*Id.* at p. 611.) However, the court clarified:

> [T]he standard, at this threshold in the listing process, requires only that a substantial possibility of listing could be found by an objective, reasonable person. The Commission is not free to choose between conflicting inferences on subordinate issues and thereafter rely upon those choices in assessing how a reasonable person would view the listing decision. Its decision turns not on rationally based doubt about listing, but on the absence of any substantial possibility that the species could be listed after the requisite review of the status of the species by the Department under [Fish and Game Code] section 2074.6. (*Ibid*.)

The range of a species for the Department's petition evaluation and recommendation is the species' California range only. (*Cal. Forestry Assn. v. Cal. Fish and Game Com*. (2007) 156 Cal.App.4th 1535, 1551.) CESA defines the "species" eligible for listing to include "species or subspecies" (Fish and G. Code, §§ 2062, 2067, and 2068), and courts have held that the term "species or subspecies" includes "evolutionarily significant units." (*Central Coast Forest Assn. v.*

Fish & Game Com. (2018) 18 Cal.App.5th 1191, 1236, *citing Cal. Forestry Assn.*, *supra*, 156 Cal.App.4th at pp. 1542 and 1549.)

Temblor Legless Lizard Taxonomy

As detailed in the Petition, the Temblor legless lizard (*Anniella alexanderae*) is one of four recently described new species along with the southern Sierra legless lizard (*A. campi*), Bakersfield legless lizard (*A. grinnelli*), and the southern California legless lizard (*A. stebbinsi*). Prior to 2013, all legless lizards in California were considered to be a single species, the California legless lizard (*A. pulchra*). Five distinct genetic lineages of legless lizards were identified in 2009, with the amount of genetic divergence corresponding to species-level differences of other lizard genera (Parham and Papenfuss 2009). Further research in 2013 considered morphological characters of these five lineages and recommended splitting *Anniella* into five distinct species; *A. pulchra* was retained as a species in the northern portion of its range and ranges were estimated for the four new species in the southern portion of the former *A. pulchra* range (Papenfuss and Parham 2013).

The recent conservation assessment by Parham et al. (2019; hereafter Conservation Assessment) provided additional evidence that the Temblor legless lizard is genetically and morphologically distinct from other species of legless lizard and has expanded and refined the known range and distribution of the species. The Conservation Assessment included a more extensive survey effort across the ranges of the *Anniella* species in California and evaluated tissue samples from museum specimens for a larger total sample size compared to earlier genetic studies (228 samples compared to 69 samples in Parham and Papenfuss 2009). The study estimated new range boundaries for the five *Anniella* species in California. The Temblor legless lizard has been recognized as a species by several herpetological societies (Crother 2017), and for the purposes of this report, we refer to the Temblor legless lizard as a species.

Petition History

On November 18, 2021, the Commission received a Petition from the Center for Biological Diversity to list the Temblor legless lizard as threatened or endangered under CESA. On November 29, 2021, the Commission referred the Petition to the Department for evaluation. At its meeting on December 15, 2021, the Commission officially received the petition. On January 18, 2022, the Department requested a 30-day extension to the 90-day petition evaluation period pursuant to Fish and Game Code section 2073.5 (b). At its meeting on February 17, 2022, the Commission granted the Department's request for a 30-day extension of the period to review the Petition and prepare this Petition Evaluation.

The Department evaluated the scientific information in the Petition as well as other relevant information the Department possessed at the time of review. The Department did not receive new information from the public during the petition evaluation period pursuant to Fish and

Game Code section 2073.4.[1] Pursuant to Fish and Game Code section 2072.3 and California Code of Regulations, title 14, section 670.1, subdivision (d)(1), the Department evaluated whether the Petition included sufficient scientific information regarding each of the following petition components to indicate whether the petitioned action may be warranted:

- Population trend;
- Range;
- Distribution;
- Abundance;
- Life history;
- Kind of habitat necessary for survival;
- Factors affecting the ability to survive and reproduce;
- Degree and immediacy of the threat;
- Impact of existing management efforts;
- Suggestions for future management;
- Availability and sources of information; and
- A detailed distribution map.

In addition, in a separate federal regulatory process, on October 20, 2020, the U.S. Fish and Wildlife Service (USFWS) received a petition from the Center for Biological Diversity to list the Temblor legless lizard as threatened or endangered under the federal Endangered Species Act (ESA). On June 17, 2021, the USFWS announced a 90-day finding that the petition presented substantial scientific or commercial information indicating that the petitioned action may be warranted and that USFWS plans to initiate a status review to determine if the petitioned action is warranted (USFWS 2021).

Overview of Temblor Legless Lizard

The Temblor legless lizard is a medium-sized, fossorial (burrowing), limbless lizard endemic to the southern San Joaquin Valley, California. The dorsal coloration is pale olive with a mid-dorsal black stripe. The Temblor legless lizard can be distinguished from all other *Anniella* species by a light gray ventral coloration that is continuous from the insertion of the lower jaw to the end of the tail, and by its higher dorsal scale count (Papenfuss and Parham 2013). It is further distinguished from *A. pulchra, A. stebbinsi,* and *A. campi* by its higher vertebral count.

[1] Although no information was submitted to the Department, one email expressing support for the Petition and restating information from the Petition was forwarded to the Department by the Commission. Email available from the Commission upon request.

The Conservation Assessment expanded the estimated range of the Temblor legless lizard. Previously, the species was only known to occur in one very small area to the east of the Temblor mountains along the southwestern edge of the San Joaquin Valley (Papenfuss and Parham 2013). The additional sampling expanded its range north more than 100 km for a total estimated range of 1,719 km^2 (664 $mi.^2$). Temblor legless lizard is found almost exclusively in alkali desert scrub and annual grasslands from 168–466 m elevation (551–1,529 ft.; Parham et al. 2019).

Due to the recent establishment of the Temblor legless lizard as a separate species, much of its natural history is known from research on *A. pulchra* before the species was split. Therefore, the following life history information is for legless lizards in general in California unless otherwise stated. *Anniella* species are primarily fossorial and crepuscular (active at dawn and dusk); they use the ground surface, as well as top layers of soil and leaf litter, for feeding and mating (Thomson et al. 2016). They are insectivores, eating larval insects, adult beetles, termites, and spiders. They breed between early spring and July and bear live young. There is evidence that some populations of *Anniella* are active year-round while others may have a dormant period in the winter, but it is unclear which of these patterns Temblor legless lizard follows.

Currently, the Department considers Temblor legless lizard to be a Species of Special Concern, carrying over the designation previously given to *A. pulchra* before the species was split, until further evaluation of the taxonomy and/or status of the species can be completed (CNDDB 2021). It has a NatureServe Global ranking of G1: Critically Imperiled, defined as "at very high risk of extinction due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors." In addition, the NatureServe State ranking for the Temblor legless lizard is S1: Critically Imperiled, giving the endemic species the same conservation status for the state-level scale as the global. Of the five California *Anniella* species, Temblor legless lizard has the highest imperiled ranking under the NatureServe system.

SUFFICIENCY OF SCIENTIFIC INFORMATION TO INDICATE THE PETITIONED ACTION FOR TEMBLOR LEGLESS LIZARD MAY BE WARRANTED

This Petition Evaluation addresses each component of the Petition below, pursuant to Fish and Game Code section 2072.3 and California Code of Regulations, Title 14, section 670.1, subdivision (d)(1).

Abundance

Scientific Information in the Petition

The abundance of the Temblor legless lizard is briefly discussed in Section VI, "Abundance" in the Petition on page 10. The species was described as rare, having been found at just seven

localities at four sites within its limited range. Given the difficulty in surveying this cryptic and fossorial species (Thomson et al. 2016), population size estimates are not available. Also, information on survey effort within the estimated range of the Temblor legless lizard is lacking. However, the petitioners consider the population small based on the limited distribution and few known detections.

Other Relevant Scientific Information

The Conservation Assessment and the California Natural Diversity Database (CNDDB) provide additional information regarding abundance. A total of 47 specimens have been cataloged in museums and expertly identified as Temblor legless lizard (Papenfuss and Parham 2013, Parham et al. 2019, Museum of Vertebrate Zoology 2022, California Academy of Sciences 2022, and Museum of Comparative Zoology 2022). While these detections do not quantify abundance, they provide context regarding the availability of information on Temblor legless lizard detections and suggest that the species may have low abundance. Also, the Department is aware of a fifth site where Temblor legless lizard has been observed (see Geographic Range and Distribution section). Additional genetic and morphological analysis comparable to that of Parham et al. (2019) applied to existing unvetted specimens could improve the understanding of abundance and clarify geographic range boundaries.

Conclusion

The Petition describes the limited known occurrences of the Temblor legless lizard at a limited number of localities and describes the difficulty in assessing abundance of the species but characterizes it as rare based on available information. Additional information available to the Department confirms that this species has very few known detections.

Population Trend

Scientific Information in the Petition

The Petition discusses trends in Temblor legless lizard habitat availability, which it presents as a proxy for population trends, in Section VII, "Population Trend," on pages 10 and 11.

Given the recent taxonomic division of Temblor legless lizard from *A. pulchra* and other *Anniella* species, as well as the cryptic and fossorial nature of the lizard, direct population trend information is unavailable for this species. There is, however, a well-documented record of habitat loss and fragmentation within the Temblor legless lizard's estimated range (Parham et al. 2019). As discussed below in "Kind of Habitat Necessary for Survival," the Temblor legless lizard is a habitat specialist, requiring loose soils in primarily alkali desert scrub and grassland; it is unable to utilize areas where soil has been compacted and vegetation has been disturbed.

The Petition explains that most of the area within the estimated range of the Temblor legless lizard is currently, has been, or is planned to be used for oil and gas drilling and urban or

agricultural development. As detailed throughout the Petition, these uses are not compatible with supporting habitat necessary for the Temblor legless lizard's survival. Surveys conducted within apparent habitat, identified through an ecological niche modeling effort, yielded no detections of individuals in areas of the Central Valley east of Highway 33, suggesting the lizard may already be extirpated from parts of its range due to human encroachment and development (Parham et al. 2019).

Other Relevant Scientific Information

As stated in the Abundance section above, a total of 47 specimens have been cataloged in museums and expertly identified as Temblor legless lizard (Papenfuss and Parham 2013, Parham et al. 2019, Museum of Vertebrate Zoology 2022, California Academy of Sciences 2022, and Museum of Comparative Zoology 2022). These specimens have been found at just seven localities at five sites (see Geographic Range and Distribution) and do not provide a comprehensive abundance estimate. Due to its reclusive nature and recent characterization as a distinct species, no historical population surveys of the species have occurred. The lack of available scientific information regarding abundance over time precludes the Department's ability to definitively assess the population trend at this time.

Conclusion

The Department is not aware of sufficient data on population abundance over time to estimate a population trend. The Petition provides information on habitat loss over time in the estimated range of the Temblor legless lizard and uses this as a proxy for population decline throughout its estimated or historical range. Based on information in the Petition and otherwise available to the Department, the trend of the Temblor legless lizard population over time is uncertain. However, it is reasonable to conclude that large losses of suitable habitat within the Temblor legless lizard range have likely led to population declines.

Geographic Range and Distribution

Scientific Information in the Petition

The Petition discusses the range and distribution of the Temblor legless lizard in Section IV, "Range," and Section V, "Distribution," on pages 6 through 10.

The Petition describes the range of the Temblor legless lizard as estimated in the Conservation Assessment, consisting of a small area between the Temblor Mountain Range and Interstate 5, with a total estimated area of 1,719 km^2 (664 $mi.^2$; Parham et al. 2019; Figure 1 and Figure 2). Of the five *Anniella* species in California, this is the second smallest range after *A. campi* (estimated range 1,317 km^2 [508 $mi.^2$]).

Ecological niche modeling conducted for the Conservation Assessment estimated a much larger area of modeled habitat than is included in the estimated range for the species (including

portions of the Central Valley and Coast Ranges to the east and west of the estimated range; Parham et al. 2019). During field verification, Temblor legless lizards were not detected on surveys in areas modeled as habitat that were highly developed or modified. This led the researchers to suggest that development has resulted in these areas no longer supporting the species (i.e., habitat loss), leading to range restriction and reduced distribution within the estimated historically occupied range (Parham et al. 2019). No legless lizards were found during surveys in apparently suitable habitat east of Highway 33 (Papenfuss and Parham 2013). Consequently, much of this highly developed area was not included in the estimated range for the Temblor legless lizard (Parham et al. 2019).

The Petition discusses the primary method of surveying for legless lizards to establish the known distribution for the Temblor legless lizard: coverboards are placed on sandy soil in summer or fall and are then checked in the following spring for presence, when the species is most active. Following the species split in 2013 (Papenfuss and Parham 2013), additional field work was conducted over four years to survey areas thought to be suitable and within the range of Temblor legless lizard (Parham et al. 2019). The Petition describes individuals confirmed to be Temblor legless lizards found in seven unique locations within four sites (each site includes 1–3 locations in close proximity to each other) ranging in elevation from 168 to 466 m (551 to 1,529 ft; Figure 2). These sites were located near the towns of Taft and McKittrick, as well as within the Department-managed Pleasant Valley Ecological Reserve east of Coalinga, and within a 2-ha (5-ac) parcel on the Palo Prieto Conservation Bank in the foothills of the Temblor Mountain RangeFigure 2.

Distribution of known populations is localized, as legless lizards exhibit high site fidelity and are not known to move far (Miller 1994, Jennings and Hayes 1994), as described in the subsection titled “Burrowing Behavior and Movement” on page 4 of the Petition. Parham and Papenfuss (2009) suggest that “habitat specificity and overall lack of motility” may limit dispersal, resulting in isolated populations.

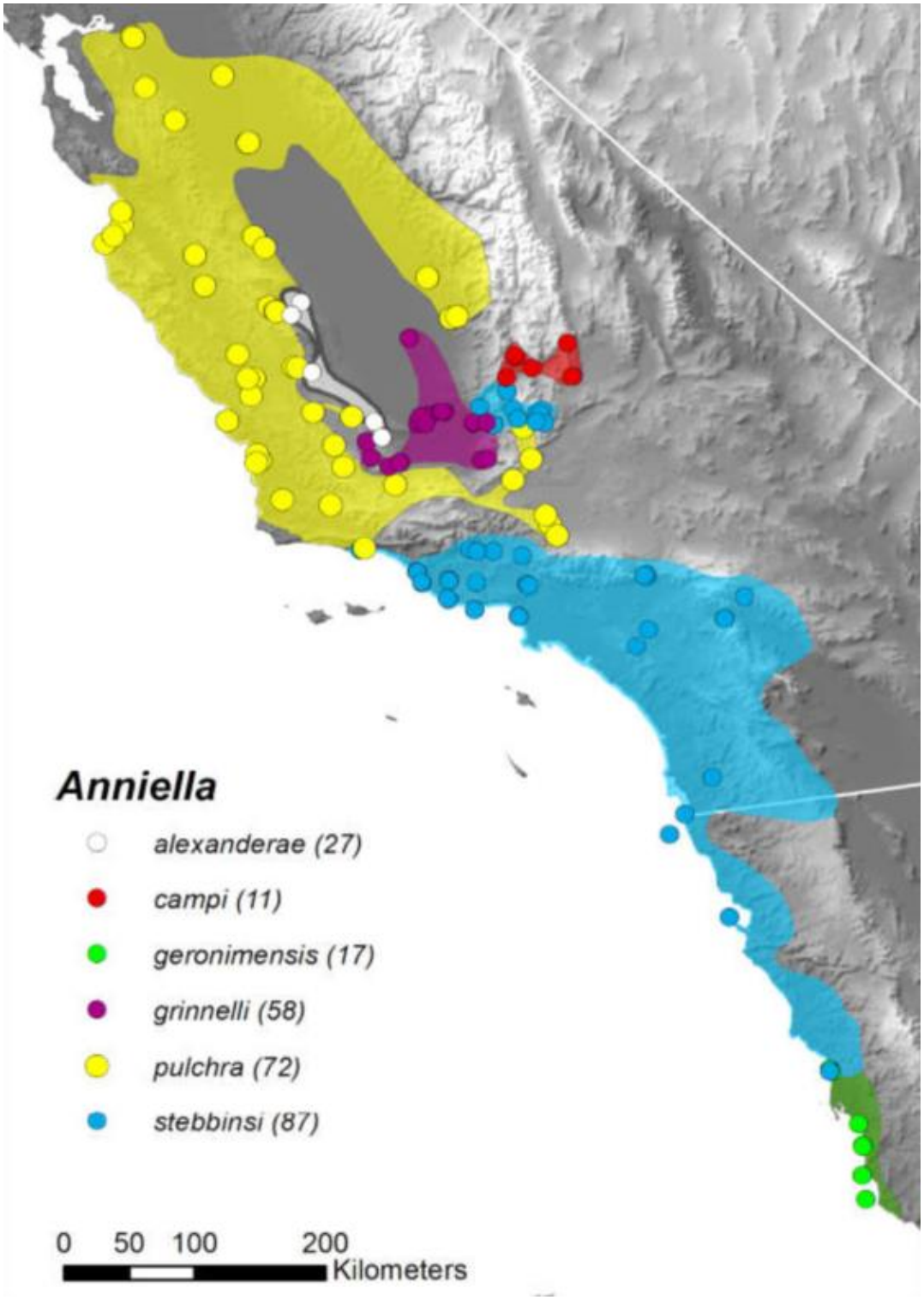

Figure 1. Estimated range map of all six *Anniella* species in California and Baja California. Temblor legless lizard (*A. alexanderae*) range is shown in white, with white circles representing Temblor legless lizard occurrences (map from Parham et al. 2019). This map was included as Figure 3 in the Petition. Note that *A. geronimensis* is a previously described species (Shaw 1940) that occurs in Baja California, Mexico and is not one of the species split from *A. pulchra*.

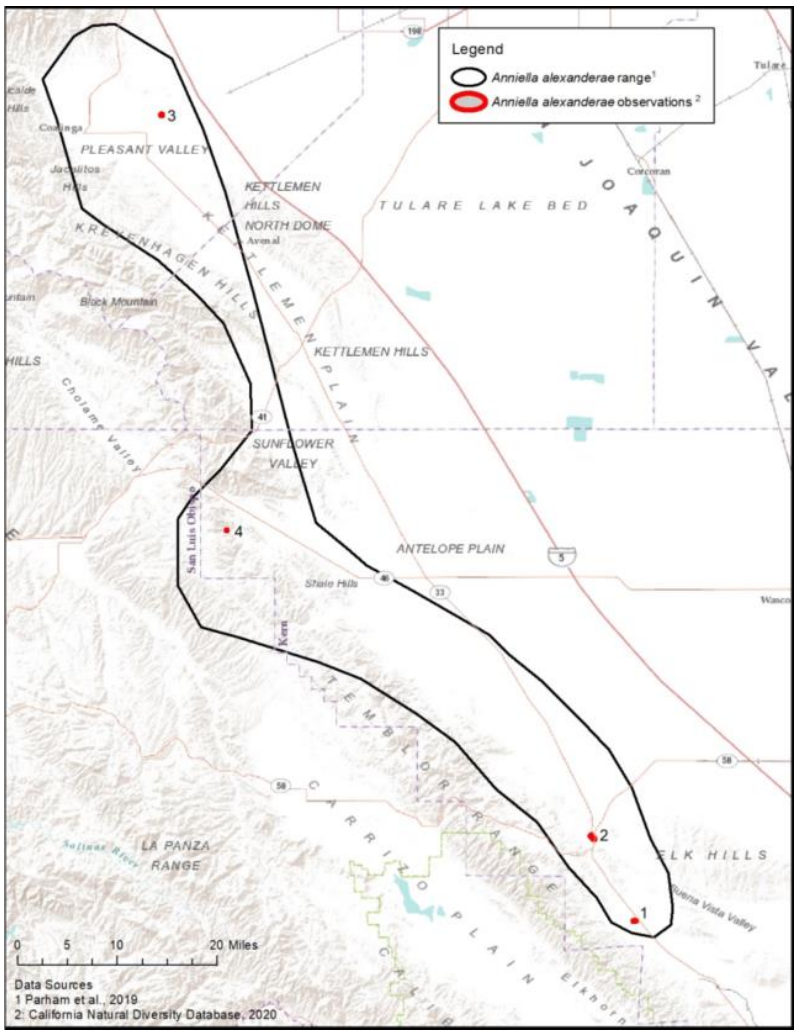

Figure 2. Map showing the estimated range and distribution of Temblor legless lizard based on surveys conducted from 2013 to 2018, as well as locations in which individuals have been found. This map was included as Figure 4 in the Petition.

Other Relevant Scientific Information

One additional occurrence of Temblor legless lizard south of Coalinga was not discussed in the Petition but is recorded in the CNDDB and was included in the recent Conservation Assessment (Parham et al. 2019). This occurrence is included in Figure 3 along with other CNDDB and museum records and other reported occurrences of *Anniella* species. Additional observations of *Anniella* that have not been identified to one of the five California *Anniella* species using the genetic and morphological methods described in Parham et al. (2019) are included in Figure 3, if within 24 km (15 mi.) of the estimated range of the Temblor legless lizard.

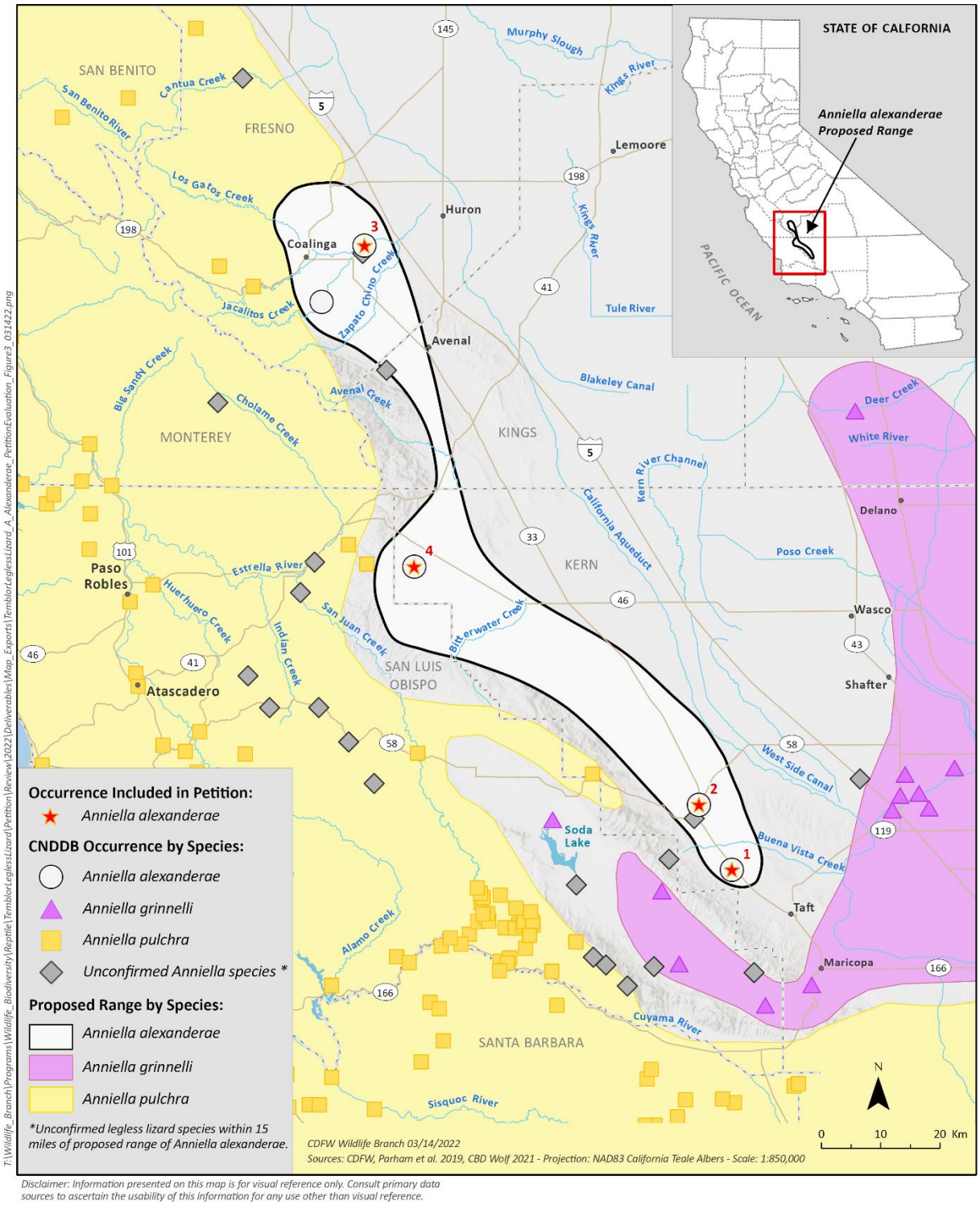

Figure 3. Map created by the Department showing *Anniella* species occurrences included in the Petition along with additional occurrences from CNDDB in and near the estimated range of the Temblor legless lizard (*Anniella alexanderae*). Unconfirmed *Anniella* species occurrences include museum records and other reported occurrences not evaluated by morphological and genetic analyses described in the 2019 Conservation Assessment (Parham et al. 2019).

Conclusion

The Petition provides sufficient information that the Temblor legless lizard has a very small range and limited distribution, making its continued existence especially vulnerable to threats it may encounter. The occurrence of unidentified *Anniella* observations in and near the estimated range and the small number of known Temblor legless lizard locations results in some uncertainty about the exact range and distribution of the species.

Detailed Distribution Map

Scientific Information in the Petition

The Petition provides a distribution map on page 9 (included here as Figure 2) indicating the estimated range of Temblor legless lizard and four sites where it has been observed.

Other Relevant Scientific Information

As described above, the Department is aware of one additional Temblor legless lizard site and several sites in the vicinity of the estimated range with unidentified legless lizards (Figure 3).

Conclusion

The Petition provides a sufficiently detailed distribution map for the Temblor legless lizard.

Life History

Scientific Information in the Petition

The Petition discusses the life history of the Temblor legless lizard in Section II, "Life History," on pages 1–5, including taxonomy, genetic differentiation, species description, and biology.

The Petition describes the taxonomic history of the Temblor legless lizard and the genetic research that contributed to the splitting of *A. pulchra* into five different *Anniella* species in California, as well as the retention of the Temblor legless lizard's status as a Species of Special Concern (CNDDB 2021).

In addition, the Petition describes the morphological characteristics of the Temblor legless lizard including general legless lizard morphology as well as characteristics used to determine species such as coloration, number of vertebrae, and scale counts (Papenfuss and Parham 2013) as illustrated in Figure 4.

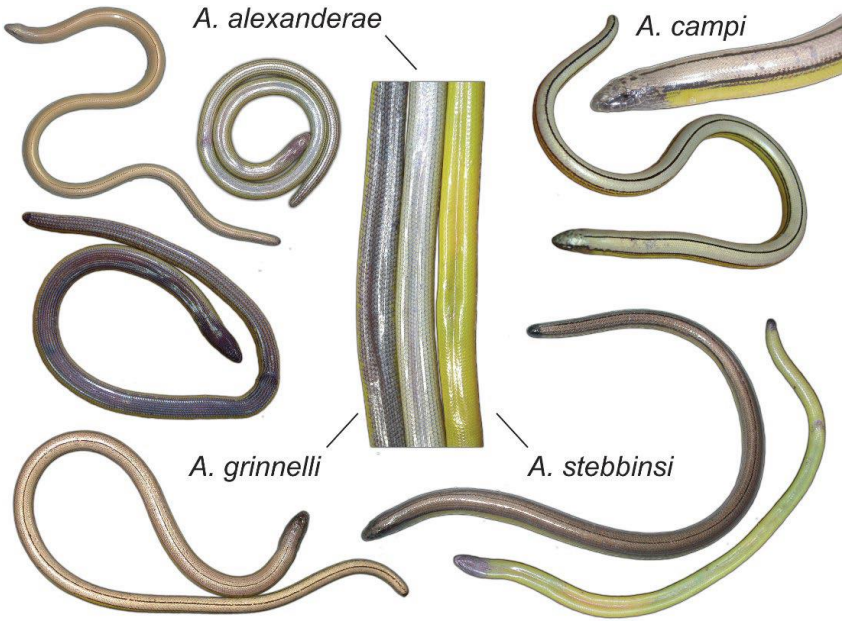

Figure 4. Diagram from Papenfuss and Parham (2013) illustrating distinguishing coloration features between *Anniella* species. This is included as Figure 1 in the Petition.

Finally, the Petition describes various aspects of the Temblor legless lizard's biology, including reproduction and lifespan, burrowing behavior and movement, temperature requirements, diet and foraging behavior, and predators. As the Temblor legless lizard is a newly recognized species, most of its life history information is inferred from research on *Anniella* species throughout California. The Petition discusses the importance of loose sandy soil for burrowing and the lizard's ability to move through the soil to access the surface for feeding and mating. It also discusses the importance of temperature to life history aspects of legless lizards. It discusses that Temblor legless lizards are mostly crepuscular and rarely move completely above ground, often lying just beneath the surface for feeding and mating but are occasionally found on the surface at night when the substrate temperatures remain above 21 °C (70 °F) for extended periods (Jennings and Hayes 1994).

Conclusion

The Petition provides sufficient information regarding the life history of the Temblor legless lizard including breeding and foraging patterns.

Kind of Habitat Necessary for Survival

Scientific Information in the Petition

The Petition discussed the necessary habitat for Temblor legless lizard in Section III of the Petition, "Habitat Necessary for Survival," on pages 5–6.

The Temblor legless lizard, like other *Anniella* species, has specific microhabitat requirements due to its fossorial behavior. They are restricted to areas with loose soil or substrate and moderate plant cover and cannot tolerate areas where soil has been compacted or graded (Jennings and Hayes 1994). Habitat studies of the Temblor legless lizard show that the species is predominately limited to alkali desert scrub and grassland at the base of the Temblor Mountain range in the San Joaquin Valley (Parham et al. 2019). Other studies of legless lizards have shown their need for specific soil moisture and density that enables essential life functions such as proper shedding and the ability to burrow and move about their environment (Miller 1944).

In a species assessment of *A. pulchra*, researchers determined that anthropogenic activities that alter the soil structure, moisture, and/or plant composition can degrade habitat quality and could cause local extinctions (Thomson et al. 2016).

Conclusion

The Petition provides sufficient information regarding the habitat necessary for survival of the Temblor legless lizard.

Factors Affecting the Ability to Survive and Reproduce

Scientific Information in the Petition

The Petition describes factors affecting the Temblor legless lizard's ability to survive and reproduce in Section VIII, "Factors Affecting Ability to Survive and Reproduce," on pages 11–27. Factors discussed include oil and gas development, urbanization, industrial solar projects, climate change, and invasive species.

Oil and Gas Development

The Petition discusses in detail the threats imposed on the Temblor legless lizard by oil and gas development throughout its range, including:

- The extensiveness of oil and gas development in the limited range of the Temblor legless lizard, stating that more than 98% of the lizard's restricted range is already open or potentially available to oil and gas development;
- Habitat loss and fragmentation;
- Soil compaction, loss of native plant life, and changes in soil moisture;
- Noise and light pollution;
- Oil spills and produced water spills;
- Wastewater disposal pits.

Urbanization

The Petition discusses the general threats of urbanization on native species and the inability of most lizard species to relocate to new habitats to avoid impacts of urbanization (Howland et al. 2014). Ecological niche modeling predicted that the Temblor legless lizard's range once

extended much further into the San Joaquin Valley, but the species has not been found east of Highway 33 (Parham et al. 2019). This area is highly developed and may have caused a local extirpation of the species in that region.

Industrial Solar Projects

The Petition discusses the impacts of industrial solar projects on habitat, including soil compaction, the removal of vegetation, changing of soil characteristics, and changes in microclimate from the presence of the solar panels (Turney and Fthenakis 2011). It also discusses the extent of solar fields currently within the San Joaquin Valley and the Temblor legless lizard's range as well as planned future solar projects in Kern County that could have an impact on habitat connectivity and suitability.

Climate Change

The Petition discusses the impacts of climate change on the Temblor legless lizard, including drought, rising temperatures, changes in hydrology and soil moisture composition, and increased frequency and severity of wildfires (Thorne et al. 2018). It further discusses how these changes in climate will impact the species given its use of and dependence on microhabitats and life history. Temperature is an important aspect of reptile biology. Major changes in average and extreme temperatures may therefore have impacts on Temblor legless lizard activity, including the species' ability to forage and find mates. In addition, the Petition describes the importance of specific soil moisture levels for the Temblor legless lizard as essential for proper shedding and the ability to hunt and feed (Miller 1944). While drought can dry out the soil, heavy flooding from more intense precipitation events such as those produced by atmospheric rivers could lead to drowning lizards in low-lying areas.

Invasive Species

The Petition also discusses how development and climate change facilitate the spread of invasive species, including invasive grasses and non-native wild pigs, causing threats to the Temblor legless lizard through degradation of habitat and increased susceptibility to predation. Invasive grasses are particularly detrimental as they change soil moisture and root structures, affecting the soil composition and reducing its suitability to Temblor legless lizards. These changes can also reduce the quality of habitat and diversity of native insects that serve as prey for the Temblor legless lizard. In addition, the presence of non-native invasive grasses can increase wildfire frequency and intensity, often converting habitat to non-native grassland following a fire which may negatively impact habitat suitability (Howland et al. 2016, Thomson et al. 2016, Evelyn and Sweet 2018).

Other Relevant Scientific Information

The Petition did not address potential impacts of non-native domesticated animals brought in through urbanization and agriculture such as cats, dogs, and rats. It has been well documented

that free-roaming cats cause an excessive amount of wildlife mortality (Loss et al. 2013), and it can be inferred that in areas where urbanization approaches the lizard's range, cats would pose an increased predatory threat.

Conclusion

The Petition provides sufficient information regarding factors affecting the ability of the Temblor legless lizard to survive and reproduce, including oil and gas development, urbanization, industrial solar projects, climate change, and invasive species that result in habitat loss, degradation and fragmentation and can restrict the species' ability to carry out essential functions such as feeding, burrowing, and reproduction.

Degree and Immediacy of Threat

Scientific Information in the Petition

The Petition discusses the degree and immediacy of threat to the Temblor legless lizard in Section IX, "Degree and Immediacy of Threat," on pages 27–28, in which it refers to other sections of the Petition and specifically discusses the severe and immediate threat of oil and gas development, which is extensive throughout the Temblor legless lizard's range. It also discusses the increasing risks posed from climate change, invasive species, and habitat loss and fragmentation from agriculture and industrial solar projects. Given the previously discussed small range and distribution of the species, along with its specialized habitat requirements, the Petition states that any of these issues could be immediately threatening to the species' continued survival and reproduction.

Conclusion

The Petition provides sufficient information detailing the degree and immediacy of threats to the Temblor legless lizard.

Impact of Existing Management Efforts

Scientific Information in the Petition

The Petition discusses existing management and regulatory mechanisms for the Temblor legless lizard in Section X, "Inadequacy of Existing Regulatory Mechanisms," on pages 28–34. This section discusses the regulatory mechanisms in place at federal, state, and local government levels and states that there is a lack of adequate protection for the Temblor legless lizard.

Regarding oil and gas development, the Petition discusses expansion of lands available for lease and expedited approval of oil and gas development at federal, state, and county levels, which the Petition states has occurred without analyzing or mitigating impacts to Temblor legless lizard. It further describes that federal and state land ownership comprise just 5.5% of the Temblor legless lizard range (Parham et al. 2019) and that over 98% of the species' range is

already open or potentially available to oil and gas development. Regarding threats to Temblor legless lizard from climate change, the Petition cites several international reports and discusses the deviation of U.S. policy at the time the Petition was submitted from commitments made in the international Paris Agreement. It further describes that the U.S. is not on track to limit warming to 1.5 °C or even 2 °C (2.7 or 3.6 °F) and is expanding, rather than restricting, fossil fuel extraction.

Related to mechanisms that could provide protections for Temblor legless lizard and its habitat, the Petition discusses the potential protection of the Temblor legless lizard under the federal ESA but describes that the 12-month finding is overdue, and the species does not receive any protection under ESA until it is listed. It also discusses two Habitat Conservation Plans (HCPs) proposed within the Temblor legless lizard's range that do not address this species in the HCPs or related environmental assessments. It further describes that other *Anniella* species are included in East San Diego and Bakersfield Natural Community Conservation Plans (NCCPs), but that the Temblor legless lizard is not yet included in any NCCP. The overlap of the Temblor legless lizard range with other protected species such as the blunt-nosed leopard lizard (*Gambelia sila*) and the San Joaquin kit fox (*Vulpes macrotis mutica*) is also discussed, and while all three species face similar threats, the Petition states that their varied use of those areas means that measures in place to protect the blunt-nosed leopard lizard or San Joaquin Kit Fox would be insufficient for protecting the Temblor legless lizard. It also states that the protections offered the species under the California Environmental Quality Act may not be strong enough despite its current status as a Species of Special Concern. The Petition discusses the Kern County General Plan, and states that it does not provide protection for the species or its habitat. The Petition further states that Temblor legless lizard would greatly benefit from the legal protections granted to a threatened or endangered species at all levels of government.

Other Relevant Scientific Information

The California Protected Areas Database (GreenInfo Network 2022) confirms that land ownership within the Temblor legless lizards' range is primarily private and unprotected, comprised of just 6.5% of lands owned in fee and protected for open space purposes.

Conclusion

The Petition provides sufficient information regarding the impact of existing management efforts. It describes the variety of regulatory mechanisms that could provide protection for Temblor legless lizard but argues that they have been inadequate to date.

Suggestions for Future Management

Scientific Information in the Petition

The Petition discusses suggestions for future management in Section XI, "Recommended Management and Recovery Actions on pages 34–35. The Petition calls for immediately stopping new oil and gas development within the Temblor legless lizard range, phasing out existing oil and gas development within the Temblor legless lizard range, initiating habitat protections to reduce impacts from development, initiating strong actions to limit climate change, and reducing the spread and impacts of invasive species.

The Petition suggests specific actions to be taken by the Governor to end new approvals for oil and gas development, begin a phase-out of existing infrastructure, and to take action on climate change. It also recommends species management actions by the Department and California Department of Parks and Recreation. These include the Department's preparation of a species recovery plan, acquisition and protection of land where Temblor legless lizards are known to occur and where habitat could be restored, development of NCCPs to protect the species on private lands, and coordination with federal agencies, local jurisdictions, and academic institutions to protect the Temblor legless lizard and its habitat.

Other Relevant Scientific Information

Other potential management actions include expansion of surveys and genetic studies to better understand the distribution of *Anniella* species in California. In addition, further research on the life history and habitat use of Temblor legless lizard specifically would be beneficial to better understand the needs of and threats to the species.

Conclusion

The Petition provides suggestions for future management actions for the Temblor legless lizard and its habitat including stopping oil and gas development, initiating habitat protections, climate action, and reducing invasive species.

Availability and Sources of Information

Scientific Information in the Petition

The Petition cites an extensive list of sources in pages 36–45.

Other Relevant Scientific Information

The Department utilized some additional information and sources when developing this Petition Evaluation. These sources include Crother (2017), Loss (2013), CAS (2022), GreenInfo Network (2022), MCV (2022), MVZ (2022), and additional data found in the Department's CNDDB.

Conclusion

The Petition provides sufficient sources of information and has made them available to the Department along with the Petition.

RECOMMENDATION TO THE COMMISSION

Pursuant to Section 2073.5 of the Fish and Game Code, the Department has evaluated the Petition on its face and in relation to other relevant information the Department possesses. In completing its Petition Evaluation, the Department has determined that the Petition and other relevant information indicates there is sufficient scientific information to indicate that the petitioned action to list the Temblor legless lizard as threatened or endangered may be warranted. The difficulty in detecting this species, as well as its new species designation and lack of species-specific research, limits the available information upon which to assess abundance and population trends. However, the Temblor legless lizard's small geographic range and limited distribution, low number of detections, habitat loss and fragmentation, and other threats described in the Petition provide an inference of threat or endangerment leading the Department to recommend that the petitioned action may be warranted. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.

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