

State of California
Natural Resources Agency
Department of Fish and Wildlife

REPORT TO THE FISH AND GAME COMMISSION

Evaluation of the Petition from Maria Jesus, the Center for Biological Diversity, and California Native Plant Society to List Inyo Rock Daisy (*Perityle inyoensis*) as Threatened or Endangered under the California Endangered Species Act



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EXECUTIVE SUMMARY

Maria Jesus, the Center for Biological Diversity, and California Native Plant Society submitted a petition (Petition) to the California Fish and Game Commission (Commission) to list Inyo rock daisy (*Perityle inyoensis*) as threatened or endangered pursuant to the California Endangered Species Act (CESA).

On February 14, 2022, the Commission referred the Petition to the California Department of Fish and Wildlife (Department) in accordance with Fish and Game Code section 2073 (Cal. Reg. Notice Register 2021, No. 32-Z, p. 1022). 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) within 120 days of receiving the Petition. The purpose of the Petition Evaluation is to evaluate the scientific information contained in the Petition in relation to other relevant information possessed or received by the Department during the evaluation period, and to recommend to the Commission whether the Petition should be accepted and considered.

The Petition presents information to indicate that the overall population trend for Inyo rock daisy is declining. Inyo rock daisy is restricted to the Inyo Mountain range of Inyo County, California. Inyo rock daisy is known from 26 occurrences in an estimated occupied area of less than 1 km² (0.62 mi²), with a global population size estimate of between 2,921 and 5,395 individuals. The Petition discusses the life history of Inyo rock daisy and the kind of habitat necessary for survival. The Petition highlights four factors that affect the ability of Inyo rock daisy to survive and reproduce, with mining being the most severe and immediate threat. Existing management efforts were reviewed and suggestions for future management actions discussed. The Petition also includes information sources and a detailed distribution map for Inyo rock daisy.

After reviewing the Petition and other relevant information, the Department has determined that the Petition meets the requirements in Fish and Game Code section 2072.3 and California Code of Regulations, title 14, section 670.1, subdivision (d)(1), which state that the Petition must include sufficient scientific information on 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 threat, impact of existing management efforts, suggestions for future management, availability and sources of information, and include a detailed distribution map. In completing its Petition Evaluation, the Department has determined that there is sufficient scientific information to indicate that the petitioned action to list Inyo rock daisy as threatened or endangered under CESA may be warranted. Therefore, the Department recommends that the Commission accept the petition for further consideration pursuant to CESA.

INTRODUCTION

Candidacy Evaluation

The Commission has the authority to list certain “species” or “subspecies” as threatened or endangered under CESA (Fish and G. Code, §§ 2062, 2067, & 2070). The listing process is the same for species and subspecies (Fish and 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 and 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 that advises the Commission on whether the petitioned action is warranted (Fish and 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 and 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 and G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

Within 10 days of receipt of a petition, the Commission must refer the petition to the Department for evaluation (Fish and G. Code, § 2073). The Commission must also publish notice of receipt of the petition in the California Regulatory Notice Register (Fish and 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 and submit to the Commission a written evaluation report with one of the following recommendations (Fish and G. Code, § 2073.5, subds. (a)-(b)):

- 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.

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) to indicate that the petitioned action to list Inyo rock daisy as threatened or endangered may be warranted.

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.*)

CESA defines the “species” eligible for listing to include “species or subspecies” (Fish and G. Code, §§ 2062, 2067, & 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). 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).

Petition History

On February 2, 2022, the Commission received the Petition from Maria Jesus, the Center for Biological Diversity, and California Native Plant Society to list Inyo rock daisy (*Perityle inyoensis*) as threatened or endangered under CESA. On February 14, 2022, the Commission referred the Petition to the Department for evaluation. At its meeting on February 17, 2022, the Commission officially received the Petition. At its meeting on April 21, 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 Commission did not receive new information from the public during the Petition Evaluation period pursuant to Fish and Game Code section 2073.4. 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 threat;
- Impact of existing management efforts;

- Suggestions for future management;
- Availability and sources of information; and
- A detailed distribution map.

Overview of Inyo Rock Daisy

Inyo rock daisy (*Perityle inyoensis* (Ferris) Powell) is a perennial subshrub in the sunflower family (Asteraceae). It was first described by Roxana Ferris in 1958 as *Laphamia inyoensis* and transferred to the genus *Perityle* in 1968 (Ferris 1958; Powell 1968). While first described in 1958, collections of Inyo rock daisy have been made as early as 1939 (CCH 2022). Inyo rock daisy is endemic to California and is known from 26 occurrences at the southern end of the Inyo Mountains of Inyo County (CDFW 2022).

Inyo rock daisy is a perennial subshrub, meaning it has long-lived woody above-ground stems at the base of the plant, with herbaceous (or less woody) stems at the ends of the plant that die back seasonally (Yarborough and Powell 2006; Baldwin et al. 2012; Keil 2012). Inyo rock daisy typically grows from 10 to 30 cm (3.9 to 11.8 in) tall and has opposite or alternate leaves that are ovate (egg-shaped) to triangular or round with serrate to serrate-lobed margins (Yarborough and Powell 2006; Keil 2012). The stems and leaves have many long, soft, spreading hairs intermixed with short, glandular hairs (Yarborough and Powell 2006; Keil 2012).

Inyo rock daisy, like most members of the sunflower family, has many flowers clustered together in an inflorescence (grouping of flowers) to give the appearance of a single flower. Inflorescences in the sunflower family can have two types of flowers, disk flowers and ray flowers. Disk flowers are generally bisexual and consist of petals with symmetrical lobes (Baldwin et al. 2012). Ray flowers are unisexual or sterile and consist of petals fused together to form a bilateral flower with a flat, strap or fan-shaped appendage (Baldwin et al. 2012). Inyo rock daisy only has disk flowers with each bisexual disk flower consisting of a yellow tubular corolla (all of the petals, collectively) with four symmetrical lobes and a total corolla length measuring between 4 and 5 mm long (Yarborough and Powell 2006; Keil 2012). Inflorescences contain 35 to 60 yellow disk flowers clustered together into a dense head of flowers (Yarborough and Powell 2006).

Inyo rock daisy produces single-seeded fruits that are 3 to 3.5 mm long (Keil 2012). The seeds lack a well-developed pappus, which is a group of structures such as awns, bristles, or scales that are attached to seeds (Baldwin et al. 2012; Keil 2012). Plants in the sunflower family often contain a pappus, which is thought to help seeds disperse, especially by wind (Sheldon and Burrows 1973). Given the absence of a well-developed pappus, Inyo rock daisy seeds likely do not use wind dispersal to travel long distances.

It is presumed that Inyo rock daisy mainly disperses through gravity moving the seeds to suitable cliff crevices, but seeds may also be dispersed through animal movement (Jesus et al. 2022).

SUFFICIENCY OF SCIENTIFIC INFORMATION TO INDICATE THE PETITIONED ACTION MAY BE WARRANTED

The 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).

Population Trend

Scientific Information in the Petition

The Petition discusses population trend for Inyo rock daisy under the “Abundance and Population Trends” section on pages 13 through 17 of the Petition. While Inyo rock daisy has been formally described since 1958 and collections have been made as early as 1939, population counts were not made and reported until the mid-1990s, meaning population trend data is limited (Ferris 1958; CCH 2022; CDFW 2022; Jesus et al. 2022). There are 26 documented occurrences of Inyo rock daisy which the Petition separates into four general areas (Figure 1): Pleasant Point (4 occurrences), Cerro Gordo (7 occurrences), Conglomerate Mesa (14 occurrences), and Santa Rosa Mine (1 occurrence). The oldest documented population count for these occurrences is from 1994 in the Cerro Gordo area with the majority of occurrences, including all Conglomerate Mesa and Santa Rosa Mine occurrences, only recently being documented (after 2010) (CDFW 2022).

Despite the lack of baseline population data, the Petition indicates that Inyo rock daisy was likely more abundant prior to mining activities and discusses the likely impact that mining has had on Inyo rock daisy at each of the four general occurrence areas (Pleasant Point, Cerro Gordo, Conglomerate Mesa, and Santa Rosa Mine). The Petition shows the locations of historic and current mining activities and the proximity of those activities to Inyo rock daisy habitat and occurrences to illustrate the relatively high likelihood that mining has negatively impacted Inyo rock daisy populations in the past and will continue to do so in the future.

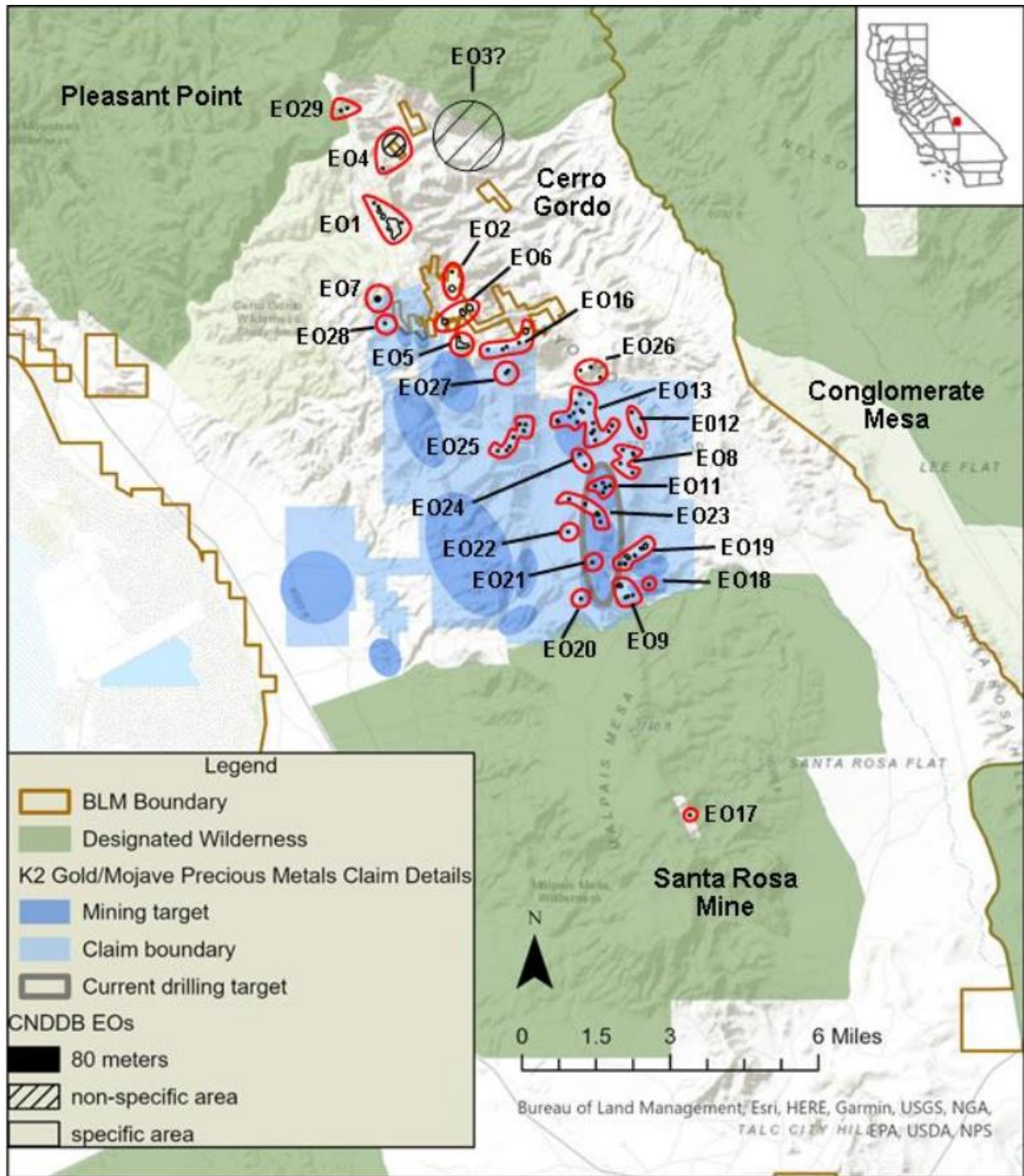


Figure 1 - Map of Inyo rock daisy range, all known occurrences, and current mining claims in the area (Jesus et al. 2022, Figure 8).

Conclusion

The Petition provides sufficient information on population trends of Inyo rock daisy. Scientific information on Inyo rock daisy's population trends is limited due to lack of baseline population data; however, the Petition presents evidence that populations were likely reduced due to historic mining activities close to known Inyo rock daisy occurrences.

Range

Scientific Information in the Petition

The Petition discusses the geographic range of Inyo rock daisy under the "Range and Distribution" section on pages 10 through 13 of the Petition. Inyo rock daisy is endemic to California and is restricted to the southern end of the Inyo Mountains in Inyo County (CDFW 2022). The Petition estimates the global range of Inyo rock daisy to be approximately 51.4 km² (19.8 mi²), but most of this range consists of unsuitable habitat. The Petition includes a map on page 11 (as Figure 8) that shows the range of Inyo rock daisy. Figure 8 from the Petition is included in this Petition Evaluation as Figure 1.

The Petition also notes that numerous attempts have been made to document range extensions and new occurrences of Inyo rock daisy from 2018 to 2021. Suitable habitat was surveyed along the Inyo crest (between the base of Pleasant Point and New York Butte), Tin Mountain, Talc City Hills, the northern portion of Malpais Mesa Wilderness, and lower elevation areas in calcareous (high in calcium carbonate) substrates (e.g. San Lucas Canyon, White Mountain Talc Road, Lower Bonham Canyon, west slope of Inyo crest), but no Inyo rock daisy populations outside of the currently known range were found (Jesus et al. 2022).

Conclusion

The Petition provides sufficient information on the range of Inyo rock daisy. The geographic range of Inyo rock daisy is restricted to a small area of California at the southern end of the Inyo Mountains in Inyo County and efforts have been made to expand the known range without success.

Distribution

Scientific Information in the Petition

The Petition discusses the distribution of Inyo rock daisy under the "Range and Distribution" section on pages 10 through 13 of the Petition. There are 26 documented occurrences of Inyo rock daisy with all occurrences restricted to calcareous rock

outcrops at the southern end of the Inyo Mountains in Inyo County (CDFW 2022; Jesus et al. 2022). The Petition calculates the area of occupancy for Inyo rock daisy to be less than 1 km² (0.62 mi²). The area of occupancy presented in the Petition was calculated from California Natural Diversity Database (CNDDDB) polygon data. CNDDDB polygons are created by buffering original data by a certain distance (depending on the type and specificity of data) and are therefore not necessarily an accurate representation of the area occupied by Inyo rock daisy (CDFW 2020). While the area of occupancy calculated in the Petition may be imprecise, many Inyo rock daisy occurrences have relatively small population sizes which likely reflect an overall small area of occupancy.

The Petition provides a map on page 11 (as Figure 8) of the known occurrences of Inyo rock daisy (based on data from the CNDDDB) to show the distribution of the species. Figure 8 from the Petition is included in this Petition Evaluation as Figure 1. The Petition also provides a table on page 12 (as Table 1) summarizing several key features (including elevation, occupied area, ownership, population size, and threats) for all known Inyo rock daisy occurrences.

Other Relevant Scientific Information

The Department possesses detailed information on the distribution of Inyo rock daisy from the CNDDDB. This information was summarized in the Petition and shown graphically in Figure 8 of the Petition (Figure 1 of this Petition Evaluation).

Conclusion

The Petition provides sufficient information on the distribution of Inyo rock daisy. The distribution of Inyo rock daisy consists of 26 occurrences within a small area of occupancy estimated in the Petition at less than 1 km² (0.62 mi²).

Abundance

Scientific Information in the Petition

The Petition discusses abundance of Inyo rock daisy under the “Abundance and Population Trends” section on pages 13 through 17 of the Petition. The Petition also summarizes population data available from the CNDDDB under Appendix 1 on pages 38 through 42 of the Petition. The Petition estimates a total of between 2,921 and 5,395 Inyo rock daisy individuals in all populations combined. This estimate is based on a combination of direct population counts, and extrapolation of the number of individuals that may be at uncounted populations. When a plant count was not conducted in the field for a given population, the Petition estimates the size of that population by multiplying estimated area occupied (from CNDDDB polygons) with estimated population densities calculated from other populations. This approach for extrapolating population

size is not always precise because CNDDDB polygons are created by buffering original data by a certain distance (depending on the type and specificity of data) and are therefore not necessarily an accurate representation of the area occupied by Inyo rock daisy (CDFW 2020).

While the Petition's abundance estimate of 2,921 to 5,395 plants should be viewed as a rough approximation of the global population size, the Petition nevertheless provides information indicating that Inyo rock daisy abundance is low. Based on population counts reported in the CNDDDB, the current abundance of Inyo rock daisy plants is likely in the low thousands (CDFW 2022).

Conclusion

The Petition provides sufficient information on the abundance of Inyo rock daisy. The global population size of Inyo rock daisy is estimated in the low thousands.

Life History

Scientific Information in the Petition

The Petition discusses the life history of Inyo rock daisy under the "Life History" section on pages 4 through 9 of the Petition. Inyo rock daisy is a perennial subshrub, which means it has long-lived woody above-ground stems at the base of the plant, with herbaceous (or less woody) stems at the ends of the plant that die back seasonally (Yarborough and Powell 2006; Baldwin et al. 2012; Keil 2012). The species flowers between June and September and produces fruits and seeds as early as July continuing through September (Keil 2012; Jesus et al. 2022). The Petition indicates that pollinators have been observed visiting Inyo rock daisy flowers, including leaf cutting bees, bumblebees, sweatbees, flies, and wasps. Inyo rock daisy has not been observed to reproduce asexually and is presumed to be self-incompatible (based on a 1968 Powell study that found other species of *Perityle* to be self-incompatible) and dependent on pollinators in order to reproduce sexually (Powell 1968, 1972; Jesus et al. 2022). The Petition indicates that little is known about seed dispersal mechanisms for Inyo rock daisy, but it can be inferred based on anatomical features (i.e., a much-reduced pappus) that Inyo rock daisy does not disperse seeds by wind and gravity is likely an important component of dispersal. Seeds may also be moved by animals but additional research is needed (Jesus et al. 2022).

Conclusion

The Petition provides sufficient information regarding the life history of Inyo rock daisy, including information on life cycle, pollinator interactions, and probable methods of seed dispersal. Inyo rock daisy is a perennial subshrub that flowers between June and

September. It is self-incompatible and dependent on pollinators to sexually reproduce. Inyo rock daisy seeds are produced as early as July continuing through September and seed dispersal is thought to occur mainly through gravity.

Kind of Habitat Necessary for Survival

Scientific Information in the Petition

The Petition discusses the necessary habitat of Inyo rock daisy under the “Life History” section on pages 9 and 10 of the Petition. The Petition states that Inyo rock daisy occurs on sparsely vegetated calcareous rock outcrops. Nearly all occurrences are located on carbonate rock (e.g., dolomite, limestone) (CDFW 2022; Jesus et al. 2022). The Petition notes that Inyo rock daisy generally occurs in pinyon (*Pinus monophylla*) woodlands but may also occur in Joshua tree (*Yucca brevifolia*) woodlands or sagebrush (*Artemisia tridentata*) shrublands. Based on herbarium collections, Inyo rock daisy can grow between 1,800 and 2,774 m (5,900 and 9,100 ft) elevation but the low elevation of 1,800 m (5,900 ft) is based on a vague 1939 E.C. Jaeger collection and may be erroneous (CCH 2022; Jesus et al. 2022). All recent mapped occurrences of Inyo rock daisy are from between 2,019 and 2,765 m (6,623 and 9,072 ft) elevation (CDFW 2022; Jesus et al. 2022).

Climate within the Inyo rock daisy’s range is described in the Petition as typical of cold desert environments with hot, dry summers and cold, moist winters. Annual precipitation is highly variable but most precipitation falls from November through March (Jesus et al. 2022).

The Petition includes a list of plant species that grow in association with Inyo rock daisy on page 9. The Petition further notes several California Rare Plant Rank plant species that occur in the same area as Inyo rock daisy.

Other Relevant Scientific Information

The Department possesses vegetation data from the Vegetation Classification and Mapping Program (VegCAMP) for the central Mojave Desert region. A vegetation map for this area was produced in 2004 using the U.S. National Vegetation Classification Standard to classify vegetation into types (Thomas 2002; Thomas et al. 2004). The minimum mapping unit for the central Mojave Desert vegetation map was 5 ha (12 ac), meaning any vegetation feature smaller than 5 ha could not be mapped as a discrete vegetation type. Based on the central Mojave Desert vegetation map, Inyo rock daisy occurrences are within vegetation types classified as: Big sagebrush shrubland (*Artemisia tridentata* Shrubland Alliance and/or *Ephedra viridis*-*Artemisia tridentata* Shrubland Alliance), pinyon woodlands and shrublands (*Pinus monophylla* Wooded Shrubland Alliance and/or *Pinus monophylla*-(*Juniperus osteosperma*) Woodland

Alliance), Joshua tree wooded shrubland (*Yucca brevifolia* Wooded Shrubland Alliance), and shadscale shrubland (*Atriplex confertifolia* Shrubland Alliance). Nearly all Inyo rock daisy occurrences are mapped within big sagebrush shrubland, pinyon woodlands and shrublands, and Joshua tree wooded shrubland vegetation types, which is consistent with information presented in the Petition. The central Mojave Desert vegetation map suggests that one Inyo rock daisy occurrence is in shadscale shrubland (CNDDDB occurrence #17 at Santa Rosa Mine); however, based on direct field observations, the occurrence is in Joshua tree woodland and shadscale (*Atriplex*) was not reported as an associate plant species (Thomas 2002; CDFW 2022). This discrepancy between the vegetation map and reported associates in the CNDDDB is likely due to the coarse scale of the vegetation map.

Conclusion

The Petition provides sufficient information regarding the habitat necessary for survival of Inyo rock daisy. The Petition states that Inyo rock daisy is restricted to sparsely vegetated calcareous rock outcrops from between 2,019 and 2,774 m (6,623 and 9,100 ft) elevation and occurs in pinyon woodlands, Joshua tree woodlands, and sagebrush shrublands.

Factors Affecting the Ability to Survive and Reproduce

Scientific Information in the Petition

The Petition discusses factors affecting Inyo rock daisy's ability to survive and reproduce under the "Factors Affecting the Ability to Survive and Reproduce" section on pages 17 through 22 of the Petition. The Petition identifies the following factors as threats to Inyo rock daisy: (1) modification and/or destruction of habitat; (2) invasive plant species; (3) climate change; and (4) vulnerability of small populations. These factors are discussed separately below.

Modification and/or Destruction of Habitat

The Petition describes habitat modification and/or destruction from mineral exploration and mining activities as the greatest and most immediate threats to Inyo rock daisy throughout its range. The Petition provides a figure on page 18 (as Figure 9) illustrating the number of active mining claims within the range of Inyo rock daisy. All occurrences of Inyo rock daisy are on lands owned by the Bureau of Land Management (BLM) or a combination of BLM and private lands, with hundreds of mining claims occurring in the vicinity of Inyo rock daisy (Jesus et al. 2022). The Petition notes that historic mining has occurred in the range of Inyo rock daisy since 1865 and mining has likely impacted the habitat of Inyo rock daisy since that time. The Petition discusses in detail the most immediate threat to Inyo rock daisy, which is from gold deposit exploration activities in

the Conglomerate Mesa area. Extensive drilling and road construction activities have been proposed in an area that coincides with five Inyo rock daisy occurrences, with additional occurrences likely to be impacted as additional drilling targets are identified (Jesus et al. 2022). These exploration activities are intended to lay the groundwork for the development of a large-scale open pit mine which would result in additional destruction and/or fragmentation of Inyo rock daisy occurrences and habitat (Jesus et al. 2022). As of March 2022, the proposal to expand gold mining exploration in the Conglomerate Mesa area was suspended after the mining company was notified by BLM that an environmental impact statement would be required (K2 Gold Corporation 2022). Even if the current mining company does not pursue the development of a large scale mine, the Petition notes that mining claims have changed ownership multiple times making mining a recurring threat to Inyo rock daisy.

In addition to habitat fragmentation and loss of habitat and individual plants, the Petition indicates mining could disrupt pollinator and seed disperser activities through extensive ground disturbance, dust, toxic chemicals, large amounts of water, and noise. Since Inyo rock daisy is thought to be self-incompatible and dependent on pollinators for sexual reproduction, the Petition mentions that disruption of pollinator activities could result in a decline in reproductive success for Inyo rock daisy.

The Petition also calls attention to development of private lands in the vicinity of Cerro Gordo as a potential threat. Portions of the Cerro Gordo Mining District have been sold with plans to develop the area into a tourist attraction, which the Petition indicates could result in increased recreational use and construction in the area and the subsequent destruction or trampling of plants.

Invasive Plant Species

The Petition mentions the presence of cheatgrass (*Bromus tectorum*) and red brome (*Bromus rubens*) throughout the range of Inyo rock daisy as a potentially significant threat. Invasion of the area from these invasive grass species could result in Inyo rock daisy seedlings facing competition in order to establish or could make the environment more favorable for non-native plant species through alteration of the nitrogen cycle (Rimer and Evans 2006; Jesus et al. 2022). High cover of non-native grasses can also facilitate the spread of fire through the landscape which could adversely impact Inyo rock daisy habitat (D'Antonio and Vitousek 1992; Brooks 1999; Jesus et al. 2022).

Climate Change

The Petition discusses the impacts that climate change may have on Inyo rock daisy. Long-term data on vegetation in the Mojave Desert indicate that plants are experiencing increased water stress from prolonged higher temperatures and reduced precipitation

levels (Khatri-Chhetri et al. 2021). This is causing many plant species to shift to higher elevations in order to cope with climate change (Kelly and Goulden 2008). The Petition notes that Inyo rock daisy already occupies the highest elevation areas within its narrow range in the southern Inyo Mountains from between 2,019 and 2774 m (6,623 and 9100 ft) elevation. Even if higher elevation areas with suitable habitat were available for Inyo rock daisy to occupy, the Petition indicates the likelihood that the species could migrate to those areas is low given its limited dispersal capacity, long generation time, and episodic recruitment patterns. The Petition also notes that suitable habitat nearby at higher latitudes and elevations is already occupied by the more common Nevada rock daisy or small-leaved rock daisy (*Perityle megalcephala*), which may outcompete Inyo rock daisy if Inyo rock daisy was able to migrate to those areas.

The Petition notes that adequate precipitation is needed for Inyo rock daisy to flower and that observations in 2021, a year of extreme drought, found few flowering stems and many inviable seeds compared to previous years. This anecdotal observation in 2021 of decreased flowering during severe drought suggests that Inyo rock daisy may be struggling with the increased frequency and severity of drought conditions that the Mojave Desert has been experiencing in recent years (Khatri-Chhetri et al. 2021).

Vulnerability of Small Populations

The Petition discusses the impact that small population size may have on the ability of Inyo rock daisy to persist in the future. As noted in the Petition, species with small population sizes are generally more vulnerable to demographic, environmental, and genetic stochastic (chance) events than species with larger population sizes. In addition, the Petition references studies that show that plant species that are self-incompatible with small population sizes (such as Inyo rock daisy) can have a reduction in seed set and offspring with reduced fitness compared to self-compatible species with larger population sizes. Inyo rock daisy occurrences have relatively small population sizes with some occurrences having fewer than 50 individuals and other occurrences having several hundred individuals (CDFW 2022). The overall global population count estimated in the Petition is between approximately 2,921 and 5,395 individuals.

The Petition highlights the Inyo rock daisy occurrence at Santa Rosa Mine (CNDDDB occurrence #17) as being especially vulnerable to the effects of small population size. The Petition describes this occurrence as having a small population size (approximately 50 individuals) and being geographically isolated from other occurrences by approximately 8 km (5 mi). The Petition notes that this occurrence is likely under threat from genetic swamping, in which Inyo rock daisy plants are replaced by hybrids (Ellstrand and Elam 1993; Todesco et al. 2016), due to its proximity to presumed *Perityle* hybrid populations at Talc City Hills and the Malpais Mesa Wilderness.

Conclusion

The Petition provides sufficient information regarding factors affecting the ability of Inyo rock daisy to survive and reproduce. The Petition discusses four factors (modification and/or destruction of habitat, invasive species, climate change, and vulnerability of small populations) and presents evidence that these factors could affect the ability of Inyo rock daisy to survive and reproduce.

Degree and Immediacy of Threat

Scientific Information in the Petition

The Petition discusses the degree and immediacy of threats to Inyo rock daisy under the “Degree and Immediacy of Threat” section on pages 22 and 23 of the Petition. The most imminent and ongoing threats to Inyo rock daisy are from mineral exploration and mining-related activities, with the Petition noting that 25 of the 26 occurrences are in areas with existing mining claims. In addition, the Petition indicates invasive plant species, climate change, and small population size all pose immediate, ongoing, and/or significant threats to Inyo rock daisy.

Conclusion

The Petition provides sufficient information detailing the degree and immediacy of threats to Inyo rock daisy. The Petition indicates mineral exploration and mining activities are the most imminent and ongoing threats to Inyo rock daisy. Invasive plant species, climate change, and small population size also pose threats to Inyo rock daisy.

Impact of Existing Management Efforts

Scientific Information in the Petition

The Petition discusses existing management and regulatory mechanisms for Inyo rock daisy under the “Impact of Existing Management Efforts” section on pages 23 and 24 of the Petition. The Petition indicates that there are currently no federal or state regulatory mechanisms to adequately protect Inyo rock daisy from immediate and ongoing threats. Nearly all Inyo rock daisy occurrences are on BLM land and the Petition notes that Inyo rock daisy is a BLM sensitive species. While BLM is directed to conserve BLM sensitive species and their habitats, the Petition indicates that the only known proactive conservation measure implemented so far by BLM has been to permit seed collecting. In addition, Inyo rock daisy is located within the California Desert Conservation Area (CDCA); however, the Petition notes that a 2017 BLM Environmental Assessment (BLM 2017) allowed mining exploration activities in Inyo rock daisy habitat to proceed without following all of the conservation and management actions set forth in the CDCA.

The Petition reports that Inyo rock daisy has been designated a California Rare Plant Rank 1B.2 species, which means it is considered rare, threatened, or endangered in California and elsewhere, and is considered moderately threatened (CNPS 2022). Plants with a California Rare Plant Rank status may meet the definition of rare or endangered under the California Environmental Quality Act (CEQA) (Cal. Code Regs., tit. 14, § 15380). Any state, local, and other (non-federal) government actions with the potential to affect the environment would be subject to environmental review under CEQA. Species that meet the definition of rare or endangered under CEQA must have any impacts to those species analyzed during the CEQA environmental review process. However, Inyo rock daisy occurs almost entirely on federal land and only actions that require discretionary approval by a state or local agency would trigger CEQA in those areas. This means that environmental review under CEQA would not be applicable for all potential impacts to Inyo rock daisy.

The Petition also discusses the Surface Mining and Reclamation Act (SMARA) which provides regulation of surface mining operations (Pub. Resources Code § 2710 et seq.; Cal. Code of Regs., tit. 14, § 3500 et seq.; Inyo County Code, tit. 7, ch. 7.70 et seq.). SMARA requires surface mining operations that disturb greater than one acre, or move more than 1000 cubic yards, to have an approved reclamation plan before mining activities commence. The Petition notes that it is possible for mining companies to work around SMARA regulations by designing their projects to disturb less than one acre in any single location even if the overall project covers a much larger area. However, the Petition did not present evidence that this has happened in the vicinity of Inyo rock daisy habitat.

Conclusion

The Petition provides sufficient information on the impact of existing management efforts on Inyo rock daisy. The Petition discusses current federal and state designations for Inyo rock daisy and explains why these designations are not adequately protecting Inyo rock daisy. The Petition presents sufficient evidence to indicate that additional management actions may be necessary to conserve Inyo rock daisy.

Suggestions for Future Management

Scientific Information in the Petition

The Petition suggests future management actions for Inyo rock daisy under the “Recommended Management and Recovery Actions” section on pages 25 through 27 of the Petition. The Petition recommends the following specific actions:

- Preserve habitat and prevent loss of habitat.
- Restrict destruction and/or removal of individual plants.
- Establish quantitative baseline population data.
- Implement a monitoring program to detect population trends.
- Manage invasive plant populations.
- Determine additional biological factors related to long-term survival.
- Assess gene flow and genetic diversity.
- Expand ex-situ plant material in conservation seed collections.
- Study consequences of hybridization.
- Ensure traditional tribal uses are maintained.

Conclusion

The Petition provides suggestions for future management actions that may aid in the conservation of Inyo rock daisy.

Availability and Sources of Information

Scientific Information in the Petition

The Petition provides a list of sources for Inyo rock daisy under the “References Cited” section on pages 27 through 36 of the Petition. Information cited in the Petition includes published literature and other sources. Electronic copies of sources from the Petition were provided to the Commission.

Other Relevant Scientific Information

The Department used additional sources of information when developing this Petition Evaluation. These sources can be found in the “Literature Cited” section of this document.

Conclusion

The Petition cites sources of information used for the Petition and has made those sources available to the Department.

Detailed Distribution Map

Scientific Information in the Petition

The Petition provides a distribution map for Inyo rock daisy in Figure 8 on page 11 of the Petition. The distribution map shows all known CNDDDB occurrences for Inyo rock daisy. This distribution map from the Petition is included as Figure 1 on page 7 of this Petition Evaluation.

Conclusion

The Petition provides a sufficiently detailed distribution map for Inyo rock daisy.

RECOMMENDATION TO THE COMMISSION

Pursuant to Fish and Game Code section 2073.5, the Department evaluated the Petition on its face and in relation to other relevant information the Department possesses. In completing its Petition Evaluation, the Department determined the Petition, and other relevant information, provide sufficient scientific information to indicate that the petitioned action to list Inyo rock daisy as threatened or endangered may be warranted. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.

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