

La Graciosa Thistle
(*Cirsium scariosum* var. *loncholepis*)
Recovery Plan



La Graciosa thistle (*Cirsium scariosum* var. *loncholepis*) in bloom at Pond B-2 within the Chevron Oil Field in San Luis Obispo County, California, May 17, 2019, Kristie Scarazzo, U.S. Fish and Wildlife Service

U.S. Fish and Wildlife Service
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An electronic copy of this recovery plan is available at:
<https://www.fws.gov/endangered/species/recovery-plans.html>.

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Introduction

This document presents the U.S. Fish and Wildlife Service's (USFWS) plan for the conservation and recovery of La Graciosa thistle (*Cirsium scariosum* var. *loncholepis* [*C. loncholepis*]). Pursuant to Section 4(f) of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.) development and implementation of recovery plans is required for listed species, unless such a plan would not promote the conservation of a particular species. Each recovery plan must include: (1) a description of site-specific management actions as may be necessary to achieve the plan's goals for the conservation and survival of the species; (2) objective, measurable criteria which, when met, would support a determination under Section 4(a)(1) that the species should be removed from the List of Threatened and Endangered Species; and (3) estimates of the time and costs required to carry out those measures needed to achieve the plan's goal and to achieve intermediate steps toward that goal.

This recovery plan is based on the Species Status Assessment (SSA) Report for La Graciosa Thistle, which includes an evaluation of the best available scientific information on the species biology and needs, current condition and future viability in terms of resilience, redundancy and representation (USFWS 2020, entire). All information in this plan is summarized from the SSA, unless otherwise cited or is based on the results of the most recent field surveys and observations. The specific operational tasks and activities required to implement the proposed recovery actions outlined within this plan are presented in the La Graciosa Thistle Recovery Implementation Strategy. The strategy is a separate document (from the recovery plan) and can be modified and refined as needed, if new information becomes available or if the approach needs to be adjusted, therefore maximizing the flexibility of species recovery implementation.

Background

La Graciosa thistle was listed as an endangered species by USFWS under the ESA in 2000 (65 FR 14888) and by the State of California as a threatened species under the Native Plant Protection Act of 1977 (Fish and Game Code Chapter 10, §1900-1913) and the California Endangered Species Act of 1984 (California Code of Regulations, Title 14, Chapter 6, §783.0-787.9) in 1990. USFWS designated critical habitat for the species in 2004 and it was revised in 2009 (Designated 69 FR 12553 and Revised 74 FR 56978). La Graciosa thistle has a recovery priority number of 2, indicating that the species faces a high degree of threat and has high potential for recovery. The first 5-Year Review of the species was conducted by the USFWS in 2011 and a subsequent review was completed in 2019. Neither of these evaluations resulted in a change of the species status and it remains listed as an endangered species (USFWS 2011 and USFWS 2019, entire).

La Graciosa thistle is considered to be a biennial or short-lived perennial species, but it has proven to be an annual under certain environmental conditions. The species is in the Asteraceae (daisy and sunflower) family and is restricted to coastal dune wetland, marsh and riparian habitats on sandy soils, along a small portion of the Central Coast of California. Its current geographic range is restricted to several sites within the Guadalupe-Nipomo Dunes Complex located in southwestern San Luis Obispo and northwestern Santa Barbara counties. There are currently 23 known occurrences of La Graciosa thistle. Of these, eight occurrences are currently

known to be extant, (which includes a new occurrence established by outplanting), 15 occurrences are likely extirpated (USFWS 2020, entire).

La Graciosa seedlings appear as a basal rosette with spines on the tips of the deeply lobed leaves and flowering heads. It flowers April through September and the flower heads are dense, compact and clustered. The individual flowers are white to faint lavender and tube-like, with exerted and fused purple anthers (male reproductive structures). The flowers are likely pollinated by a variety of insects including ants, beetles, butterflies and flies. The fruits are achenes (a dry, single-seeded fruit derived from a single ovary) topped with a pappus of bristles that functions much like a parachute to assist with wind and aquatic dispersal. Most La Graciosa thistle seedlings originate from seeds deposited the previous summer, but the species appears to have a minimally persistent seed bank.

The species needs intact wetland habitats with water on or near the surface across the landscape. La Graciosa thistle exists as groups of individuals in wetland habitats in an arid and semi-arid landscape. The plants inhabit the margins of wetlands (swales, lakes, ponds, freshwater marshes, streams, rivers, seeps). Many of the wetlands in the sand dune complexes occur where the groundwater table is at or near the surface and the water levels rise and fall naturally with rainfall.

Threats

The primary threats to La Graciosa thistle are the following: (1) reduced water/lack of water, with groundwater decline as the likely major cause, along with hydrological alteration and climate change, including severe drought and increased temperatures, and (2) flooding resulting from hydrological alteration (USFWS 2020, p. 12). The groundwater decline appears to result primarily from extraction for urban, agricultural and industrial uses, and it is exacerbated by drought and climate change. Groundwater decline causes habitat loss and degradation for La Graciosa thistle. Due to its minimally persistent seed bank, any occurrence of La Graciosa thistle that has not had flowering plants over several consecutive years is at risk of extirpation. Other threats to La Graciosa thistle include: herbivory; habitat alteration due to invasive plant species, dead vegetation, feral pigs, and gophers; inbreeding; habitat loss due to agriculture and development; uncontrolled cattle grazing; road and ditch maintenance; off road vehicles; and stochastic events (USFWS 2020, p. 17).

Recovery Vision

The ultimate vision for La Graciosa thistle recovery entails not only survival and conservation of the species and its habitat, but also restoration to a state that is fully viable throughout most of its historical range. Recovery of the species will be indicated by steady and increasing demographic trends and threat reduction. Implementation of this recovery plan will lead to a comprehensive increase in the species viability, so that protections under the ESA are no longer warranted.

Recovery Strategy

The La Graciosa thistle recovery strategy is the course of action designed to achieve recovery of the species, so that the threats are ameliorated and the risk of extinction is lowered to an acceptably low level. Recovery of the species will require that a sufficient number of occurrences within each of the four geographic populations throughout the range are protected and restored to the degree necessary for them to be self-sustaining, meaning the population trends are stable or increasing with minimal levels of management.

The primary strategy for recovery of La Graciosa thistle is to first implement a series of actions to prevent extinction of the species. These near-term actions focus efforts at the remaining extant occurrences to prevent local extirpations by restoring habitat and minimizing the threats at each of these sites. Then a series of longer-term actions will be implemented for La Graciosa thistle recovery that are intended to fill knowledge gaps, streamline management and monitoring techniques, and systematically re-establish the species at several extirpated occurrences and potentially introduce the species to new sites across the historical range.

The recovery strategy will most effectively be achieved by successful engagement and collaboration among various land-owners and other working partners in an effort to fulfill the goals and objectives provided below. Once most of the near and longer-term actions are underway, the species status will be evaluated against the downlisting recovery criteria, which when met indicate that La Graciosa thistle may warrant a change in status from an endangered to a threatened species. Similarly, after the species is downlisted and the recovery program continues to be successful, the status of La Graciosa thistle will be evaluated against the delisting criteria, which when achieved indicate that protections of the species under the ESA may no longer be necessary. The specifics regarding the downlisting and delisting criteria are outlined below.

Population Units

Because the La Graciosa thistle historical range consists of four discrete geographic populations, the following population units are identified for this recovery plan: 1) Sand Dune Complexes, 2) South Orcutt, 3) Solomon Hills and 4) Vandenberg South (Figure 1). The fundamental purpose of re-establishing and maintaining multiple occurrences within each population unit is to increase the resiliency, to restore representation across the formerly occupied locations and ecotypes, and to provide greater redundancy to safeguard against losses due to catastrophic events such as extreme flooding. Outplanting efforts can also occur within other suitable habitat areas located outside of the limits of these delineations, which are intended to serve for preliminary planning purposes.

Recovery Goal and Objectives

The ultimate goal of this recovery plan is to specify the suite of actions that, when implemented, will adequately protect self-sustaining La Graciosa thistle populations throughout its geographic range and ensure the species' long-term viability. The aim of the plan is also to reduce the threats to the species and its habitat and to facilitate its downlisting from endangered to threatened status, and eventually the delisting of the species.

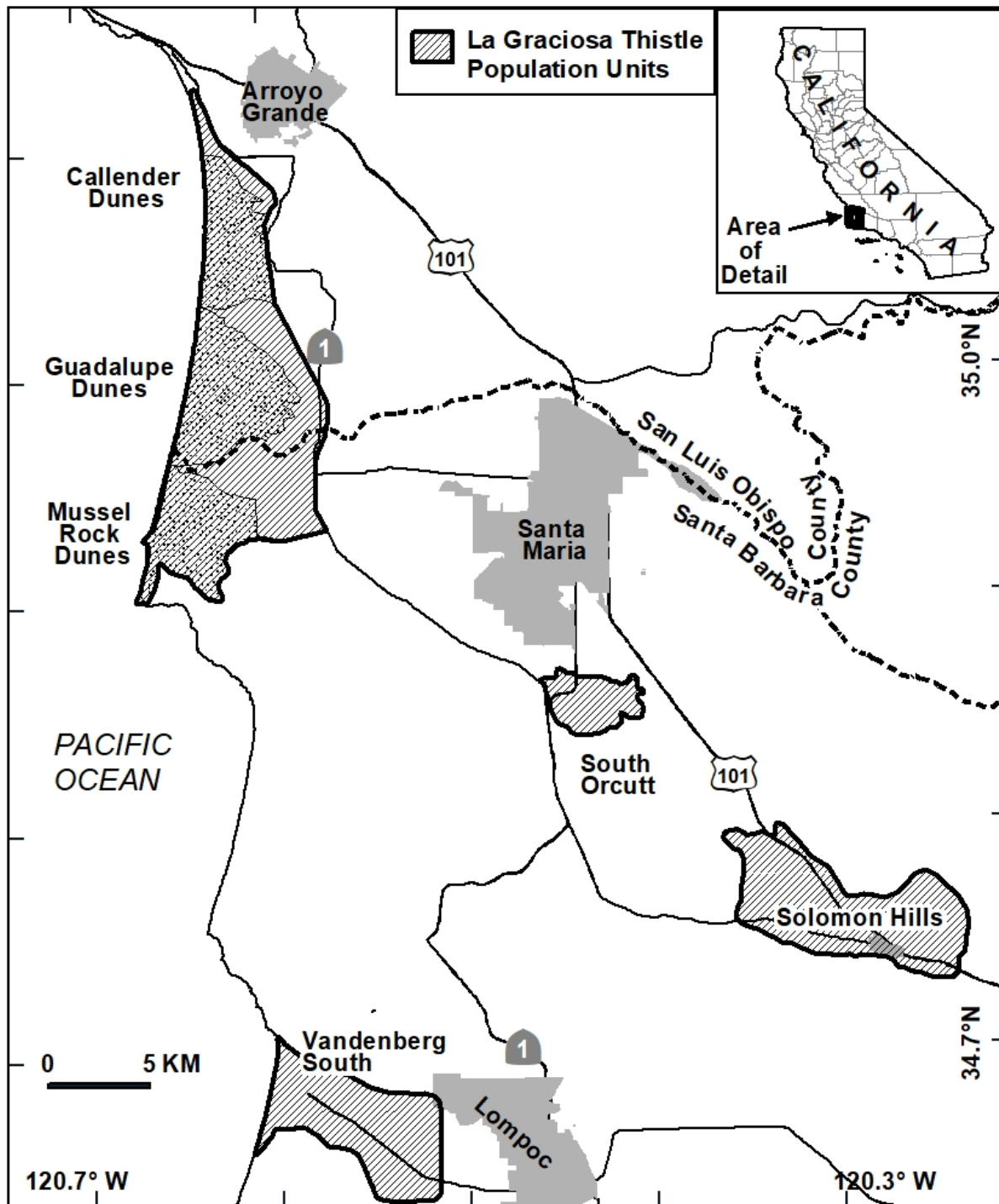


Figure 1. La Graciosa thistle (*Cirsium scariosum* var. *loncholepis* [*C. loncholepis*]) population units in San Luis Obispo and Santa Barbara counties, California. The four population units from north to south are: Sand Dune Complexes, South Orcutt, Solomon Hills and Vandenberg South. These population units are based on the four geographic populations recognized in the La Graciosa thistle SSA (USFWS 2020).

For the recovery goals to be met, a series of objectives need to be accomplished. The recovery objectives are the explicit tasks designed to transition La Graciosa thistle from its current condition to a restored and viable condition. Species viability is defined and characterized by the three conservation biology principles of resilience, redundancy and representation (Shaffer and Stein 2000, pg. 307-308 and 310-311 and Wolf et al 2015, pg. 200, 204-206). Additional information regarding the results and analysis used to quantify the current status of La Graciosa thistle is presented in the SSA (USFWS 2018).

Based on our 2020 SSA, of the 23 known occurrences of La Graciosa thistle, 15 are likely extirpated and eight are extant. Five of the eight extant occurrences have very low resiliency, suggesting very little ability to withstand stochastic events and natural environmental variation. Two extant occurrences have moderate resiliency, suggesting moderate ability to withstand stochastic events and natural environmental variation. One extant occurrence has high resiliency, suggesting high ability to withstand stochastic events and natural environmental variation. The results of our representation analysis indicate that the genetic diversity and spatial extent of La Graciosa thistle has likely declined. The eight extant occurrences of La Graciosa thistle are in the Sand Dune Complexes geographic population. Representation across the other three geographic populations appears to have been lost, suggesting the species has lost potential capability of adapting to changes (natural or human caused) in its environment. With only eight extant of 23 known occurrences in 2020, which is down from nine extant of 17 known occurrences at time of Federal listing in 2000, the redundancy of La Graciosa thistle is severely reduced, decreasing the ability of the species to survive unpredictable and highly consequential events for which adaptation is unlikely (e.g. prolonged drought or large-scale flooding).

Therefore, the primary recovery objective is to increase the species' resiliency, redundancy and representation to ensure the species' long-term viability. This will be accomplished through implementation of a series of near and longer-term recovery actions that, over time, will alleviate threats to the species and restore the species viability. Specifically, habitat restoration and outplanting at the existing occurrences and re-establishment of several independent occurrences throughout most of the population units will result in an increase in resiliency, redundancy and representation. Recovery will be signified by consistent resiliency of occurrences to withstand stochastic events, by representation of the species across the range, and by sufficient redundancy to ensure survival in the face of catastrophic events.

Recovery Criteria

According to the definitions provided in the ESA, an endangered species is a species that is in danger of extinction throughout all or a significant portion of its range and a threatened species is one that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. When we evaluate whether or not a change in the species status is warranted, such as downlisting or delisting, we consider if the species continues to meet either of these definitions or not. A recovered species is one that no longer meets the definitions of endangered or threatened because the threats to that species have been ameliorated and its viability has been restored to levels expected to be sustainable into the foreseeable future.

Recovery criteria outline the specific conditions that, when met, indicate that a species may warrant downlisting or delisting. They also serve as the performance measures or targets to track the species progress towards achieving recovery. Recovery criteria are our best assessment at this time of what needs to be completed so that the species may be downlisted from an endangered to a threatened species and can subsequently be removed from the list of threatened and endangered species. Because we cannot predict the exact course that recovery may take and because our understanding of the species' vulnerability to threats is likely to change as more information becomes available about the species and the threats, it is possible that a status review may indicate that downlisting is warranted although not all of the recovery criteria have been met. Conversely, it is possible that the recovery criteria could all be met and a status review may indicate that downlisting is still not warranted because, for example, a new threat emerged that is not addressed in the current recovery criteria.

Downlisting Criteria

La Graciosa thistle may be considered for downlisting when the following criteria are met:

- 1) At least nine occurrences exist, with a minimum of two occurrences from each of two different population units, and they display stable or increasing trends over 10 consecutive years.¹
- 2) Each of the nine occurrences is being consistently managed in a way that will support the continued existence of La Graciosa thistle and its habitat, including seed banking, propagation and outplanting efforts, invasive weed abatement, and assurances for adequate hydrology within associated aquatic features.
- 3) Annual monitoring and reporting demonstrate that management is effective over 10 consecutive years.
- 4) An *ex situ* conservation seed bank is established and maintained at one or more facilities certified by the Center for Plant Conservation.

Delisting Criteria

Once the downlisting criteria have been met, La Graciosa thistle may be considered for delisting when the following criteria are met:

- 1) At least 13 occurrences exist, with a minimum of two occurrences from each of three different population units and they display stable or increasing trends over 10 consecutive

¹ Nine occurrences were chosen because there were nine extant occurrences when the species was listed as endangered in 2000. At the time of listing, the nine extant occurrences were neither stable nor managed for long-term persistence. We expect above-ground population size to fluctuate annually, based on response to amount and timing of rainfall. A period of 10 years should be long enough to include most of the variability in rainfall that occurs in this region. Therefore, at this time, we believe that nine extant occurrences that are either stable or increasing over 10 years and managed for long-term persistence is appropriate for downlisting.

years.²

- 2) Each of the 13 occurrences is secure from known, plausible threats including from groundwater decline.
- 3) Each of the 13 occurrences is being consistently managed in a way that will support the continued existence of La Graciosa thistle and its habitat, including seed banking, propagation and outplanting efforts, invasive weed abatement, and assurances for adequate hydrology within associated aquatic features.
- 4) Annual monitoring and reporting demonstrate that management is effective over 10 consecutive years.

Recovery Actions

Recovery actions are the prioritized, site specific management interventions that need to be taken to conserve, manage, restore and enhance La Graciosa thistle and its habitat to meet the recovery criteria. The recovery actions identified are based on the best available science and are those that the USFWS deem necessary to move La Graciosa thistle towards recovery.

We split the recovery actions into two categories, near-term and longer-term, based on the level of urgency associated with the specific actions. Near-term recovery actions are those that need to be initiated immediately and that are designed to reduce the species' high risk of extinction. These efforts are predominantly focused on the extant occurrences, as opposed to extirpated sites or new sites for outplanting. Longer-term recovery actions are those that also should be initiated immediately but have a broader, more strategic scope that will take longer to achieve full implementation. Longer-term recovery actions also have several research-based elements that, when accomplished, will fill knowledge gaps and be used to inform future restoration plans and guide successive recovery decisions. Both the near-term and longer-term recovery actions for La Graciosa thistle are provided below.

Near-Term Recovery Actions

The aim of the near-term recovery actions is to prevent extirpation of the species at the eight extant occurrences, all of which are in the Sand Dunes Complex Population Unit. The actions include:

- 1) Habitat Restoration – invasive weed treatments with herbicides, abatement and removal to prevent re-infestations; woody debris removal to clear out downed trees and tree limbs; possibly thinning and trimming excessive arroyo willow (*Salix lasiolepis*), poison oak (*Toxicodendron diversilobum*) and blackberry (*Rubus* spp.); and management of dense thatch. Habitat restoration may also require dredging of aquatic features and other remedial measures to augment and renovate local hydrologic regimes.

² Thirteen occurrences were chosen because this would establish two more occurrences (four total) at three of the four population units, thereby re-establishing the species throughout most of the historical geographic range. At this time, we believe that this would be sufficient representation and redundancy, stable or increasing over 10 years, for removal of the species from the list of threatened and endangered species.

- 2) Supplemental Watering – when necessary during drought or lack of water, specifically to ensure survival of particular individual plants and/or colonies.
- 3) Installation of Exclusionary Fencing and/or Cages – around individuals and colonies of La Graciosa thistle to prevent herbivory from mammals such as deer (*Odocoileus hemionus*) and rabbit (*Sylvilagus audubonii*), and trampling from wild pig (*Sus scrofa*). Fencing may also be used for disturbance studies associated with seasonal cattle grazing.
- 4) Propagation and Outplanting – coordinated and directed efforts to collect seed when and if it is readily available to produce seedlings from tracked maternal lines, which will be outplanted at locations that are extirpated, that have extremely low numbers of individuals and could become extirpated, or at appropriate sites located within close proximity to the extant occurrences.
- 5) Annual Monitoring and Reporting – these efforts are required to assess the effectiveness of the near-term actions, track and census the numbers of individuals at each occurrence and to both guide and determine future recovery actions. The property owners/managers of each extant occurrence have agreed to complete five consecutive years of annual monitoring with reporting and to participating in the near-term La Graciosa thistle recovery program.

Longer-Term Recovery Actions

The longer-term recovery actions are intended to inform the strategic future development of the species recovery program, fill important knowledge gaps and to systematically move the species towards downlisting and eventual delisting. These actions can occur within any and all of the population units, include future research needs, and consist of the following:

- 1) Establish and Maintain a Conservation Seed Bank – seed will be collected from all extant occurrences and deposited into a permanent conservation collection at a facility that is certified by the Center for Plant Conservation. Certified affiliates are part of a national network that follow stringent guidelines for seed conservation banking set by the International Board for Plant Genetic Resources and in consultation with the National Laboratory for Genetic Resource Preservation. Once deposited, seed will be stored and curated in perpetuity to serve as emergency back-up if the species becomes extinct in the wild and for other recovery purposes.
- 2) Seed Viability Studies and Bulking – once the conservation seed bank is established, research will be conducted to evaluate the viability of La Graciosa thistle seed and efforts to bulk the seed will be pursued. These activities are to ensure that abundant seed is readily available for subsequent outplanting projects and recovery efforts.
- 3) Re-establish Several Extirpated Occurrences – facilitate outplanting efforts at numerous sites that are likely to have cooperative recovery partners based on the current land ownership status and land use practices and/or that conducive conservation easements are

already established. These priority sites include and are presented in numeric order:

- Occurrence 1 at Vandenberg Air Force Base; Vandenberg South Population Unit, would re-establish the species in the southwestern part of the geographic range.
 - Occurrence 13 at Oso Flaco Lake in Oceano Dunes State Vehicular Recreation Area; Sand Dune Complex Population Unit; owned by California Department of Parks and Recreation.
 - Occurrence 14 at Pismo State Beach; Sand Dune Complex Population Unit; owned by California Department of Parks and Recreation. This site also has the Oceano Dunes District Visitor Center, which could provide an opportunity to promote public education/outreach for La Graciosa thistle.
 - Occurrence 16 at Black Lake Ecological Area; Sand Dune Complex Population Unit; owned by Land Conservancy of San Luis Obispo County.
- 4) Establish cooperative relationships with other landowners – engage potential partners with the goal of surveying parcels not previously surveyed for additional occurrences or suitable habitat that could be used for additional outplanting efforts.
- 5) Fulfill Research Needs – work with partners to fund research and other collaborative studies to fill knowledge gaps about the species including (but not limited to) the following: best management practices and methods for the various life stages of the species; species response to disturbance from grazing, thatch removal and other vegetation management techniques; demographic studies, pollination ecology research, genetics research, habitat suitability analyses and modeling, groundwater testing and mapping and other hydrologic modeling for evaluating variable climate change scenarios.

Estimated Time and Cost of Recovery Actions

Table 1 below summarizes the estimated time and costs to achieve recovery of La Graciosa thistle. The costs include financial, volunteer, and in-kind support as well as conservation endeavors likely to be supported by other cooperating agencies. The estimate does not include any actions that took place or project funding that was obligated prior to development of this recovery plan. We anticipate that full implementation of the near-term recovery actions would improve the status of La Graciosa thistle, so that the immediate threat of extinction is ameliorated. Simultaneously, implementation of the longer-term recovery actions needs to be initiated. As the near-term and some longer-term actions are completed, the species would likely be eligible for reclassification as a threatened species after 10 consecutive years of monitoring. After that 10-year time period, persistence of viable, self-sustaining populations will be further assessed and monitored, and subsequent recovery actions will continue to be accomplished. After 20 consecutive years of monitoring and full implementation of the longer-term recovery actions, we expect consideration of the species for delisting to be plausible. We expect the total time to recovery to be 30 years.

Table 1: Estimated Time and Costs of La Graciosa Thistle Recovery Actions

Recovery Action Number	Recovery Action	Estimated Time Required to Achieve	Estimated Cost
1	Habitat Restoration	3-5 years	\$385,000
2	Supplemental Watering*	5 years	\$154,000
3	Installation of Exclusionary Fencing	3-5 years	\$79,000
4	Propagation and Outplanting	30 years	\$317,000
5	Annual Monitoring and Reporting	30 years	\$185,000
6	Conservation Seed Bank Collection	5 years	\$50,000
7	Seed Viability Studies and Bulking	5 years	\$127,000
8	Re-Establish Several Extirpated Occurrences	30 years	\$1,000,985
9	Pursue Access to Other Properties	10 years	\$20,000
10	Fulfill Research Needs	20 years	\$890,000
Total estimated costs			\$3,207,985

*Supplemental watering does not include installation or development of any major new infrastructure, such as deep wells, pumping systems and supply pipeline networks. This task does include minor irrigation systems, manual delivery such as hand watering and trucks, portable water tanks, shallow submersible wells and solar pumping technologies. If major infrastructure is determined to be necessary for species recovery, increased costs and time allocations may be necessary and these are not currently included in the scope of this recovery plan.

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