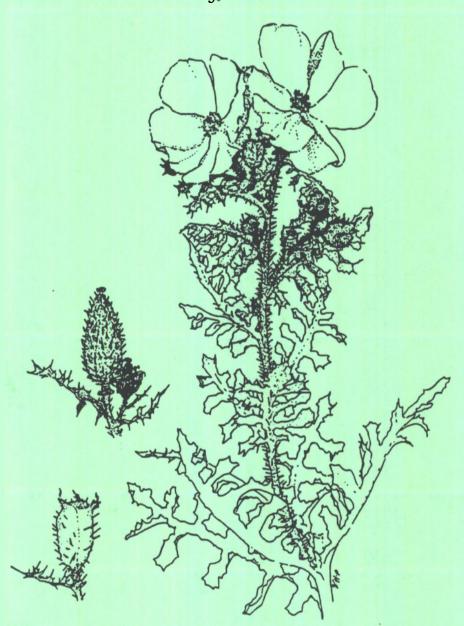
# Sacramento Prickly Poppy (Argemone pleicantha ssp. pinnatisecta) Recovery Plan



U.S. Fish and Wildlife Service Albuquerque, New Mexico 1994

## SACRAMENTO PRICKLY POPPY

(Argemone pleiacantha ssp. pinnatisecta)

RECOVERY PLAN

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Albuquerque, New Mexico

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#### Disclaimer

Recovery plans delineate reasonable actions that are believed to be required to recover and/or protect the species. Plans are published by the U.S. Fish and Wildlife Service, sometimes prepared with the assistance of recovery teams, contractors, State agencies and others. Objectives will be attained and any necessary funds made available subject to budgetary and other constraints affecting the parties involved, as well as the need to address other priorities. Recovery plans do not necessarily represent the views nor the official positions or approval of any individuals or agencies involved in the plan formulation, other than the U.S. Fish and Wildlife Service. They represent the official position of the U.S. Fish and Wildlife Service only after they have been signed by the Regional Director as approved. Approved recovery plans are subject to modification as dictated by new findings, changes in species' status, and the completion of recovery tasks.

#### Literature Citations

Literature Citations should read as follows:

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#### **Executive Summary**

<u>Current Status:</u> The endangered Sacramento prickly poppy (<u>Argemone pleiacantha</u> ssp. <u>pinnatisecta</u>) is known from 10 canyons in 7 different canyon systems in the Sacramento Mountains of south-central New Mexico.

Habitat Requirements and Limiting Factors: The Sacramento prickly poppy occurs on open, disturbed sites ranging from xeric uplands to riparian areas in 10 canyons on the western slope of the Sacramento Mountains of south-central New Mexico. Its primary habitat includes stream banks and seeps, limestone canyon bottoms and side drainages. It is also found on north slopes, along roadsides and water pipeline rights-of-way. Major threats to the Sacramento prickly poppy include surface-disturbing activities from water pipeline projects (repair, replacement, and maintenance), road construction and maintenance (including mowing and herbicide use), flash floods, trampling and grazing from livestock, and off-road vehicles.

Recovery Objectives: Change the status of the Sacramento prickly poppy from an endangered to a threatened species.

Recovery Criteria: Establish or maintain 10 reproducing populations of Sacramento prickly poppy within the 10 currently-occupied canyons. The maintenance of populations must be documented through monitoring over at least a 10-year period. The populations should be geographically distinct and represent the total geographic range and genetic variability of the species.

## Major Actions Needed:

- 1. Study biological and habitat requirements of the species.
- 2. Develop a management plan for the City of Alamogordo's water pipeline project in the Alamo and Fresnal canyon systems with measures to avoid or reduce impacts to populations.
- 3. Develop a management plan with the Lincoln National Forest and the Bureau of Land Management (BLM) for Sacramento prickly poppy plants located on lands under their jurisdiction. Conduct long-term monitoring studies to evaluate the impacts of livestock grazing and trampling, and off-road vehicles on these populations.

- 4. Develop a management plan with the New Mexico State Highways and Transportation Department for populations occurring in the Highway 82 right-of-way and any other plants affected by their management.
- 5. Develop a conservation agreement with private landowners to protect plants on private property.
- 6. Conduct surveys in potential habitat.

## Estimated Total Cost of Recovery (\$000's):

Year	Need 1	Need 2	Need 3	Need 4	Need 5	Need 6	Total
1994	37	20	40	15	15	5	132
1995	43	20	20	10	10	5	108
1996	39	10	20	5	5	5	84
1997	39	10	10	3	3	0	65
1998	26	5	10	1	1	0	43
1999	21	1	10	1	1	0	34
2000	10	0	0	0	0	0	10
2001	5	0	0	0	0	0	5
2002	5	0	0	0	0	0	5
2003	5	0	0	0	0	0	5
2004- 2014	50						50
Total	280	66	110	35	35	15	541

Date of Recovery: Downlisting of this species could occur as early as 2014.

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# PART 1 - INTRODUCTION

## Brief Overview

The Sacramento prickly poppy (Argemone pleiacantha ssp. pinnatisecta Ownbey; Papaveraceae) was listed as an endangered species under the Endangered Species Act of 1973 (Act), as amended, on August 24, 1989 (U.S. Fish and Wildlife Service (Service) 1989). This plant is known only from the Sacramento Mountains in Otero County, south-central New Mexico. Approximately 80 percent of the known Sacramento prickly poppy populations occur on the Lincoln National Forest. Habitat for this species has been described as both open and disturbed by various botanists (Spellenberg 1977, Wagner and Sabo 1977, Soreng 1982, Malaby 1987). This species occupies areas varying from xeric upland to mesic sites, including arid canyon bottoms, old fields and dry terraces above riparian areas, roadsides, pipeline rights-of-way, north slopes, and along streams and stream banks, springs, seep areas, and side drainages (Malaby 1987). Sacramento prickly poppy is threatened by the following surface-disturbing activities: water pipelines (ongoing repair, replacement, and maintenance), road construction and maintenance (herbicide use and mowing), grazing and trampling by livestock, off-road vehicles (ORV), erosion, and flooding. Sacramento prickly poppy has a recovery priority of 3 (based on high degree of threat and high recovery potential for a subspecies). Recovery priorities for listed species range from 1 to 18, with species ranking 1 having the highest recovery priority.

#### Taxonomy

Sacramento prickly poppy was first described in George Ownbey's monograph of the North and Central American species of Argemone (Ownbey 1958). The botanical description of Sacramento prickly poppy is based upon a specimen collected by George and Findley Ownbey (\$1754), on August 12, 1953, "9.6 miles west of Cloudcroft, altitude 6,600 feet, Otero County, New Mexico." Prior to this description, Sacramento prickly poppy was considered part of the Argemone platyceras complex (Soreng 1982). However, this name included what are currently considered to be many taxa distributed throughout the western U.S. and Mexico. Argemone platyceras is now applied only to species endemic to Mexico (Soreng 1982). Although Argemone is a common genus in the New Mexico flora, no other species of Argemone occurs within the range of Argemone pleiacantha ssp. pinnatisecta.

#### Morphology

Sacramento prickly poppy is a robust, short-lived perennial, 0.5-1.5 m (1.5-5.0 ft) tall with 3-12 branching stems and striking, blue-green colored leaves. The leaves are about 10.0-15.0 cm (4.0-6.0 in) long, with rectangular sinuses and spine-tipped lobes extending almost to the midrib. The veins and midrib are armored with stout, yellow spines. The large and showy white flowers have 6 petals 3.0-4.0 cm (1.2-1.6 in) long and 8.0-9.0 cm (3.5 in) wide, with numerous orange stamens and a purple stigma. Capsule spines are simple. The small, round, black seeds are 2.5 mm (0.1 in) in diameter and dispersed by wind, water and possibly animals (R. Galeano-Popp, U.S. Forest Service (USFS), pers. comm., 1992; R. Sivinski, New Mexico Energy Minerals and Natural Resources Department (NMEMNRD), in litt., 1992). In addition to the deeply divided leaves and simple capsule spines, Sacramento prickly poppy has white-colored stem sap. These features readily distinguish the subspecies from Argemone pleiacantha ssp. pleiacantha, which has less deeply divided leaves, denser capsule spines with 1 or 2 minute spines at the base, and yellow-orange stem sap (Spellenberg 1977, Martin and Hutchins 1990, Wood 1990). Malaby (1988) provided additional information on the sap color, observing that stem sap is white but yellow sap is present in the roots of Argemone pleiacantha ssp. pinnatisecta.

#### Distribution and Abundance

Sacramento prickly poppy is limited both in numbers of individuals and locations of occurrence. Approximately 1,286 total plants of Sacramento prickly poppy occupy 10 canyons on the western slope of the Sacramento Mountains in south-central New Mexico. The Forest Service is the principal land management agency within the range of this subspecies and 1,135 plants have been documented from Forest Service lands (Table 1). The subspecies is also known from BLM and private lands, Oliver Lee State Park, New Mexico State and Otero County road rights-of-way, and City of Alamogordo water pipeline rights-of-way.

Table 1. Sacramento prickly poppy plants known to occur on Forest Service lands within the Lincoln National Forest (Wood 1990).

Population	Canyon	· · · · · · · · · · · · · · · · · · ·	Plants	
1	Fresnal		72	
	La Luz		<b>8</b> _	
	Salado		1	
2	Dry		11	
3	Alamo		744	
•	Caballero		117	
4	Mule		7	
5	San Andres		18	
6	Dog Canyon		157	
7	Escondido*			
		Total	1135	

<sup>\* =</sup> This population of 45 plants only occurs on private land.

About 76 percent (861 plants) of the total Forest Service population occurs in Alamo Canyon and its tributary, Caballero Canyon. Approximately 36 plants occur on BLM land at the mouth of San Andres Canyon (L. McIntosh, BLM, pers. comm., 1993). It is uncertain how many plants of Sacramento prickly poppy occur on private land in the area because Federal land managing agencies are not authorized to conduct plant surveys on private property (Galeano-Popp, pers. comm., 1992). Based on past surveys, The Service estimates that the entire range of this species covers an area of about 90 square miles (USFS 1992).

Sacramento prickly poppy occupies 10 canyons in 7 canyon systems on the Cloudcroft District of the Lincoln National Forest. Populations occur in Fresnal Canyon (including Salado and La Luz canyons), Dry Canyon, Alamo Canyon (including Caballero Canyon), Mule Canyon, San Andres Canyon, Dog Canyon, and Escondido Canyon. Surveys conducted by Sarah Malaby of the Forest Service for Sacramento prickly poppy from 1987-1989 resulted in the discovery of small numbers of plants in Mule, Dry, and San Andres canyons. The largest population with the highest density of plants is found in Alamo Canyon. The distribution of Sacramento prickly poppy is almost continuous throughout Alamo Canyon and its tributary, Caballero Canyon. Two populations occur in Fresnal Canyon and Dog Canyon. There are several scattered plants that occur in canyons, on alluvial benches, on slopes, and along streams and wet seeps between the larger populations.

In addition to conducting Sacramento prickly poppy surveys and mapping known locations, Malaby (1988) established permanent monitoring plots in Dog and Alamo canyons. Monitoring data were collected during 1988, 1989, and 1991 (USFS 1992).

In 1989, approximately 1,300 plants of Sacramento prickly poppy were known to occur in 10 canyons of the Sacramento Mountains. The northern limit of this species' range was La Luz Canyon and the southern limit was Dog Canyon. The range of Sacramento prickly poppy was extended further south in 1990, when an additional 45 plants were counted by Forest Service botanists in Escondido Canyon (S. Wood, USFS, pers. comm., 1990). No additional plants or range extensions have been reported since that time.

All populations listed in the literature are currently extant, with the exception of three historic locations. Elmer O. Wooten collected the plant in La Luz Canyon in 1901, above 6,000 feet elevation. It is not clear whether this portion of the La Luz Canyon population was extirpated. The location was described as an igneous soil and Sacramento prickly poppy is currently known only on limestone-derived soils. Two additional specimens were collected east of the High Rolls area, by Ownbey (#1753), "6.4 mi west of Cloudcroft on Highway 82," and D.B. Dunn (#8090), at "Mountain Park, in an apple orchard." On the Lincoln National Forest, approximately 1,100 individuals were found in 6 populations during recent surveys (Wood 1990). In all canyons except Alamo, Sacramento prickly poppy exists in small populations with less than 200 individuals. The Mule, Dry, and San Andres canyon populations each contain less than 50 individual plants. Small populations such as these are more vulnerable to extirpation from stochastic events than larger populations.

In the <u>Flora of the White Mountains Area</u>, Hutchins (1974) mentioned potential habitat for this species on the Mescalero Apache reservation. Hutchins surveyed these areas for a 5-year period but never found Sacramento prickly poppy (J. Peterson, Ecological Services Field Office, U.S. Fish and Wildlife Service, <u>in litt.</u>, 1988). Recent communication with the Mescalero Apache Reservation (N. Marsh, Natural Resources Division, pers. comm., 1993) revealed that Sacramento prickly poppy still has not been found on the Mescalero Apache Reservation, although there is potential

habitat. Additional surveys are needed to determine whether this species actually occurs on the Mescalero Apache Reservation.

#### **Habitat**

Sacramento prickly poppy occurs in rocky canyons on the western slope of the Sacramento Mountains. It ranges from 4,200 feet elevation in the lower Dog Canyon area to 7,120 feet elevation in upper Alamo Canyon area (Malaby 1987). The topography of the area is characterized by steep, rocky hillsides. Soils are primarily derived from limestone and may also contain sandstone and gypsum (USFS 1992). Numerous large canyons and arroyos drain westward into the Tularosa Basin. Annual precipitation in the Sacramento Mountains averages about 38 cm (15 in) per year, most of which occurs from July through October, during brief but heavy thundershowers (U.S. Soil Conservation Service (SCS) 1981). All canyons on the west side of the Sacramento Mountains experience periodic and severe flash floods (USFS 1992). Wide fluctuation in diurnal and seasonal temperatures is characteristic of the western slope of the Sacramento Mountains. Temperatures average above 90 degrees Fahrenheit from mid-May to mid-September and may go as low as 16 degrees Fahrenheit during the winter (SCS 1981). High temperatures combined with high insolation and high evaporation rates create xeric conditions in the western foothills of the Sacramento Mountains.

Sacramento prickly poppy occurs in plant biotic communities within the Sacramento Mountains that range from Chihuahuan Desert Scrublands and Grasslands at lower elevations to Great Basin Conifer Woodland vegetation at higher elevations (Brown 1982).

The following species occur in association with Sacramento prickly poppy (Malaby 1987): Celtis reticulata (netleaf hackberry), Chilopsis linearis (desert willow), Fraxinus velutina (velvet ash), Juniperus monosperma (oneseed juniper), Prosopis glandulosa (mesquite), Ouercus qambeli (Gambel oak), Q. grisea (gray oak), Berberis haematocarpa (red barberry), Brickellia laciniata (cutleaf brickelbush), Fallugia paradoxa (apache plume), Rhus trilobata (skunkbush), Larrea tridentata (creosote bush), Andropogon scoparius (little bluestem), Aristida spp. (three-awn), Bouteloua curtipendula (side-oats grama), B. eriopoda (black grama), B. gracilis (blue grama), Muhlenbergia spp. (muhly grass), Sitanion hystrix (squirreltail), Sporobolus cryptandrus (sand dropseed), Gutierrezia sarothrae (snakeweed), Opuntia spp. (prickly pear), and Vitis arizonica (canyon grape).

Much of the habitat information on Sacramento prickly poppy is a result of Malaby's field work (1987, 1988, 1989). A habitat description for this species is provided in her 1987 report:

Plants were most commonly found on natural and man-disturbed sites with a significant water supply, including dry stream beds, stream banks, pipeline rights-of-way and roadsides. Habitat soils were typically loose and gravelly. Most plants grew on relatively flat sites, those on slopes primarily occupied north, northeast and northwest aspects (Malaby 1987).

The wide range of habitats occupied by Sacramento prickly poppy (riparian to xeric uplands) has created uncertainty about its habitat requirements.

The habitat of Sacramento prickly poppy has been described as being disturbed and either semi-riparian or with a reliable seasonal provision of water (Malaby 1987). This opinion is shared by numerous botanists that have studied this species (Wagner & Sabo 1977, Fletcher 1978, Spellenberg 1978, Sivinski 1992). Sites that collect surface water are considered favorable for seedling establishment, yet mature plants are often observed in more xeric sites (USFS 1992). Seedlings may require more moisture for germination and establishment because the young roots are easily desiccated. More mature plants possess a long tap root that may be able to withstand drought and obtain moisture several feet below the soil surface (USFS 1992). Malaby (1987) found Sacramento prickly poppy growing within several spring sites and noted:

Too much water does not appear to be a limiting factor for the subspecies as long as soils are well drained. For example, in San Andres (Andres) Canyon, one plant was growing in the gravel of the stream bed, a foot from flowing water. And, as noted in Dog Canyon, plants were clustered around Fairchild Springs and a smaller spring where water was running over the ground. On all of these sites, plants were vigorous and flowering.

In addition to enhanced moisture, Sacramento prickly poppy seedlings may require open areas free of other, competing vegetation for successful establishment. Various botanists have cited surface-disturbing activities as necessary for Sacramento prickly poppy establishment (Spellenberg 1977, Wagner and Sabo 1977, Soreng 1982, Malaby 1987). However, this is disputed by one Forest Service report (USFS 1992), "Although some degree of

disturbance is usually associated with recruitment, this species does not increase in response to disturbance to the extent that its co-geners do."

It is uncertain which forms and how much surface disturbance is optimal for Sacramento prickly poppy establishment. Generally, prickly poppies occupy disturbed areas and are indicators of habitat disturbance.

Malaby (1987) speculated that climate may be limiting Sacramento prickly poppy distribution at various elevations:

At its lower elevations, <u>Argemone pleiacantha</u> ssp. <u>pinnatisecta</u> is probably limited by lack of moisture or too high of temperatures.... Too short a growing season to complete its life cycle may also be a factor at higher elevations. Poppies at 7,120 feet in upper Alamo Canyon were still flowering and without capsules in mid July while those at 4,800 feet in lower Alamo Canyon had produced mature capsules and were senescing....

Plant competition was suggested as another limiting factor in Sacramento prickly poppy distribution by Malaby (1987), "The more densely vegetated areas on the slope were less commonly occupied by poppies...and the subspecies may instead be limited by competition from other species..." Sivinski (pers. comm., 1993) believes that open and disturbed sites needed for Sacramento prickly poppy establishment may "heal" over time as plant competition increases and therefore, become less favorable for establishment by this species.

Malaby (1987) observed signs of a former fire in Dog Canyon and speculated it created habitat favorable for the establishment of Sacramento prickly poppy, "Plants growing on the site could have become established when it was more open, such as after a burn..." Wood (pers. comm., 1993) stated that Dog Canyon had more favorable habitat for Sacramento prickly poppy than other canyons and attributed this to fire. Further studies are needed to evaluate the impacts of fire on Sacramento prickly poppy habitat.

# Life History and Ecology

Based on observations of presently occupied habitat, Sacramento prickly poppy appears to favor early successional stages within desert shrub and pinyon-juniper vegetation types (Wood 1990). Forest surveys indicate young plants occur primarily on open, disturbed sites and that

their recruitment is tied to moisture conditions. Recruitment is typically limited.

Flowering begins in May and continues throughout the fall depending on elevation and moisture conditions (Wood 1990). Seed output for midsized plants in Alamo and Dog canyons averaged about 2,000 seeds per plant (Malaby 1988). However, based on nursery results, seed germination is low (approximately 3 percent in 1989) and seedling mortality is high (Malaby 1988). Seedlings are susceptible to desiccation, being washed out by floods and other factors. Once established, the plants develop deep tap roots that appear resistant to drought, mechanical injury and small floods. Unless a major disturbance occurs, established individuals can persist on a site for several years (USFS 1992).

Little is known about the life history and ecology of Sacramento prickly poppy. Additional studies, as described on page 15, are needed before specific management recommendations can be developed for this species.

Pollinators for Sacramento prickly poppy were photographed by Malaby (1987). These included various insects: carpenter bees (Xylocopa californica var. arizonensis), honey bees (Apis mellifera), bumblebees (Bombus spp.), soldier beetles (Cantharidae) and lizard beetles (Liguriidae), flies (Diptera) and butterflies (Lepidoptera). Malaby (1987) noted that honey bees and carpenter bees were the most frequent pollinators of Sacramento prickly poppy.

Ownbey (1958) observed a waxy coating and pitted vesicles on the surface of Sacramento prickly poppy seeds and concluded that dispersal occurred from surface water runoff. Other field workers have also shared this opinion (Spellenberg 1977, Wagner and Sabo 1977, Soreng 1982, Malaby 1987). Seed studies done by Sivinski (<u>in litt.</u>, 1992) support Owenby's conclusion:

As one would expect, the largest seed load is immediately beneath the maternal plant. The seed load quickly declines as distance from the parent increases. On flat areas, few seeds were detected by our methods at distances greater than 2.5 meters. No seeds were recovered from a distance greater than 1.5 meters down stream from the plants studied in the dry wash channel.

The majority of Sacramento prickly poppy seeds do not travel far from the parent plant and would remain there if flash floods did not move these large and heavy seeds downslope through the canyon drainage channels. The seeds of Sacramento prickly poppy contain an oily endosperm and are easily crushed (Sivinski, pers. comm., 1993). This large endosperm could be a potential source of food for various rodents, birds, and insects. Dispersal by animals to upland sites may account for the occasional presence of prickly poppy plants in areas away from drainages.

Soreng (1982) observed ants transporting seeds. It is uncertain if they were attracted by oily glands or elaiosomes attached to the seeds that may provide food for insects.

Sivinski (1992) studied the germination requirements for Sacramento prickly poppy and found:

Germination can only occur after cold stratification and is further enhanced if the seed coat is also scarified. This indicates that the seeds are in the soil at least one winter prior to germination. Natural scarification might occur when the seeds are transported down drainage channels with the sandy bedload of sediment....

It is uncertain how seeds of this species are scarified in nature. It may occur when seed is transported down slope during a flash flood or perhaps through digestion in the gizzard of birds (Sivinski 1992).

## Reasons for Listing

When listed in 1989, Sacramento prickly poppy was threatened by the following surface-disturbing activities: Water pipeline construction, flooding, livestock grazing, and road construction and maintenance activities. Off-road vehicles were not recognized as a potential threat to Sacramento prickly poppy until recently (USFS 1992).

A water pipeline has provided the City of Alamogordo and surrounding area with potable water since the early 1900's. The City purchased water rights for Fresnal Canyon (including La Luz Canyon) and Alamo Canyon (including Caballero and Gordon canyons) through the Adjudication Process of 1918 (P. Light, City of Alamogordo, pers. comm., 1993). Perennial springs at higher elevations in Alamo and Fresnal canyons were capped and

flow transported downslope through approximately 150 miles of steel pipeline (Light, pers. comm., 1992). Currently, the City has water rights to 17 cubic feet per second (cfs) or 12 million gallons of water per day from the Fresnal Canyon system and 5 cfs or 3.5 million gallons per day from the Alamo Canyon system. Peak flows occur during snow melt in February. Peak water use occurs in June when upper canyon stream flow is at its lowest ebb. Water is the most limiting factor for agriculture and growth within the Alamogordo area. Most ground and well water is either too saline or alkaline to drink. Consequently, the water pipeline is the most important source of potable water for the Alamogordo area.

Pipeline repair, replacement, and maintenance are ongoing in five canyons (Alamo, Caballero, Gordon, Fresnal, and La Luz). The City uses heavy equipment to transport, excavate, position and remove the large sections of steel pipe within Sacramento prickly poppy habitat.

Flash floods have long been recognized as a threat to arroyo populations of Sacramento prickly poppy and at times, may be so severe that they scour the canyon bottoms. A flash flood during 1978-79 destroyed approximately 100 plants in Alamo Canyon (Soreng 1982). Several small floods in Caballero Canyon destroyed 22 plants during 1988-89 (USFS 1989). On the other hand, flooding may also create habitat for new populations of prickly poppy, and also transport scarified seed to these newly created sites.

Livestock grazing has been identified as another potential threat to the Sacramento prickly poppy (Soreng 1982). During the late 1800's and early 1900's, record numbers of goats, sheep, cattle, and horses were grazed in the Sacramento Mountains (USFS 1992). However, the relationship of past overgrazing impacts to the current distribution and condition of Sacramento prickly poppy populations is poorly understood. Modern grazing management on the Lincoln National Forest is more restricted and uses lower stocking rates than in the past (Galeano-Popp, pers. comm., 1993). Under the present grazing management system, the Lincoln National Forest allows 6 months of rest for every area grazed during a 6-month period. This method was criticized by some botanists because no effort was made to move cattle evenly within grazing pastures. This has, at times, resulted in severe overgrazing within riparian areas and canyon bottoms where livestock congregate during the dry season. The Forest Service is studying the impacts of grazing on Sacramento prickly poppy recruitment (Galeano-Popp, pers. comm., 1993).

The Forest Service has five allotments (Sacramento, San Andres, Escondido, Dry, and La Luz) on the western slopes of the Sacramento Mountains (USFS 1992). The Sacramento allotment (including Alamo, Deadman, Caballero, and Mule canyons) has not been grazed since 1984. All westside canyons, with the exception of Dog Canyon, are occupied by Sacramento prickly poppy and grazed by livestock. The grazing period varies with each allotment (Table 2). Potential impacts to Sacramento prickly poppy include grazing and trampling of plants located near roads, trails, and water sources (Wood 1990).

Table 2. Grazing periods for five allotments in the Sacramento Mountains.

Allotment Cu	rrent Dates of Permitted Grazing
Dry Canyon	November 1 through May 31
Escondido Canyon*	November 16 through May 1
La Luz Canyon (south)	February 20 through March 29
Sacramento	November 1 through May 1
San Andres Canyon	December 1 through May 31

Initially, livestock grazing was not considered a major problem for Sacramento prickly poppy, due to the assumption that it was unpalatable to livestock. All parts of the plant are covered with rigid spines and most species contain toxic alkaloids such as protopine, berberine, sanguinarine, and dihydrosanguinarine (Schmutz and Hamilton 1979). Fletcher (1977), Regional Botanist for the Forest Service at that time, wrote, "Grazing has little effect on this taxon. Only rarely was the plant (Sacramento prickly poppy) noted to have been cropped and this was done when other forage was virtually nonexistent." However, grazing was first recognized as a potential threat to Sacramento prickly poppy by Soreng (1982):

Mature plants of this subspecies are generally well protected from large herbivore grazing by the abundant spines and prickles on their tough vegetation, and by their bitter milky sap....

Seedlings and young plants may be more vulnerable to grazing as they would have more succulence, and by having softer spines than

mature plants.... It is possible that herbivory may be a limiting factor in seedling and young plant survival.

Later, Fletcher (1983a) wrote, "Spring grazing was intensive enough that no prickly poppy plants could be found. This is the first time grazing has been heavy enough to affect the prickly poppy there (Dog Canyon)." Monitoring to document whether these same plants died or recovered the following year was not conducted (Galeano-Popp, pers. comm., 1993). Therefore, it is difficult to evaluate the past or current impacts of herbivory on Sacramento prickly poppy.

Soreng (1982) suggested that livestock trampling may be a limiting factor in seedling and young plant survival. Seedlings have seldom been observed (Spellenberg 1977, Malaby 1987, Wood, pers. comm., 1993). Seedlings may have been simply overlooked during field surveys as suggested by Malaby (1987) or high mortality rates may result from livestock trampling. Trampling by livestock may also result in degradation of Sacramento prickly poppy habitat and open it up to encroachment by weedy species.

County and State road construction and maintenance, including herbicide use and mowing of the highway right-of-way, was also considered a threat to the species at the time of listing. A population of Sacramento prickly poppy occurs within and along State Highway 82 right-of-way, between High Rolls and Cloudcroft. This stretch of highway was proposed for widening but was dropped from consideration by the New Mexico State Highways and Transportation Department (NMSHTD) because of concerns over impacts to this population of Sacramento prickly poppy (D. DeLorenzo, USFS, pers. comm., 1993). The NMSHTD decided to adopt an annual, routine maintenance schedule for Highway 82 and uses an independent contractor to do this work. In 1991, the Lincoln National Forest asked the NMEMNRD to survey and flag Sacramento prickly poppy plants in the Highway 82 right-ofway to protect them during maintenance work (DeLorenzo, per. comm., 1993). In July 1993, several Sacramento prickly poppy plants were nearly destroyed during maintenance of pullouts in the Highway 82 right-of-way. crew and foreman were shown the flagged plants and informed of their federally protected status (DeLorenzo, pers. comm., 1993). Effective communication between the NMSHTD and the Forest Service should prevent this type of event in the future.

In recent years, off-road vehicles were recognized as another threat to Sacramento prickly poppy populations (USFS 1992):

Alamo, Dry, Fresnal, and La Luz Canyons are used by off-road vehicles (ORV).... Although closed to motorized vehicles, unauthorized ORV travel is sometimes a problem in Alamo and Dry Canyons but to a lesser degree in Fresnal and Caballero Canyons.

Placement of permanent barriers would restrict access to areas having populations of Sacramento prickly poppy and minimize impacts from ORV travel in Sacramento prickly poppy habitat.

#### Conservation Measures

Taking and Trade Prohibitions. Sacramento prickly poppy was listed as endangered under the Act in 1989. The Act prohibits the malicious damage, destruction, or removal and reduction to possession of listed plants on areas under Federal jurisdiction. For all other areas, the Act prohibits removing, cutting, digging up, damaging or destroying listed plants in knowing violation of any State law or regulation, or in the course of any violation of a State criminal trespass law. This Act and the Lacey Act also prohibit any person subject to the jurisdiction of the United States from selling, offering for sale, importing, exporting, or transporting in interstate or foreign commerce in the course of a commercial activity, any listed plant species. Under certain circumstances, the Act provides for the issuance of permits to carry out otherwise prohibited activities involving listed species.

Sacramento prickly poppy is also a New Mexico State endangered plant species listed in the New Mexico Natural Heritage Department (NMNHD) Rule 85-3 of the New Mexico State Endangered Species Act (NMSA) 9-10-10. This law prohibits the taking, possession, transportation and exportation, selling or offering for sale any listed plant species. Listed species can only be collected under permit from the State of New Mexico for scientific studies and impact mitigation.

Section 7 Requirements. Section 7 of the Act requires that all Federal agencies consult with the Service to ensure that actions authorized, funded or carried out by such agencies do not jeopardize the continued existence of any listed threatened or endangered species or their habitats. It is the responsibility of the Federal action agency to determine if the proposed action may affect a listed species or adversely modify or destroy critical habitat. Informal consultations with the Service are often undertaken by Federal action agencies to assist them with

their determination of a project's potential impacts. During informal consultation, the Service may be able to assist the action agency to develop alternatives that eliminate a potential "may affect" situation. If a "may affect" determination is made, the Federal agency shall initiate the formal section 7 consultation process with the Service. There have been numerous informal consultations addressing concerns associated with the Sacramento prickly poppy. In addition, a formal consultation with the Forest Service (Lincoln National Forest) regarding the City of Alamogordo's water pipeline replacement project for Fresnal Canyon considered potential impacts to Sacramento prickly poppy. Another consultation considered impacts to the species from the Forest Service's Interim Grazing Plan for the Sacramento Allotment Management Plan.

Conservation Planning and Management. The Forest Service developed two drafts of a management plan for Sacramento prickly poppy populations on the Lincoln National Forest in 1990 and 1992. This plan needs to be updated and finalized.

The BLM, with the cooperation of the Service, should develop a management plan for the Sacramento prickly poppy located on lands under its jurisdiction.

Research. Little is known regarding the biology or habitat requirements of Sacramento prickly poppy. Preliminary studies have been conducted on seed germination requirements and the identification of insect pollinators. The seed germination requirements of Sacramento prickly poppy were evaluated by NMEMNRD, Forestry and Resources Conservation Division, through a section 6 project funded in Fiscal Year 1992 (Sivinski, in litt., 1992). Sivinski found that viability for Sacramento prickly poppy seed averaged 90 percent using the tetrazolium metabolic activity indicator test. Germination averaged 41 percent after a combination of cold stratification (refrigeration for 6-weeks at 2 degrees Celsius (10 degrees Fahrenheit) and scarification (nick the seed coat treatment).

The Lincoln National Forest established a Sacramento prickly poppy seedling nursery in Alamo Canyon in 1987 (Wood 1990) and obtained the following information:

Based on nursery results, seed germination is low (approximately 3 percent in 1989) and seedling mortality is high. Seedlings are susceptible to drying out, being washed out by floods and possibly other factors. Once established, the plants develop

deep tap roots and appear fairly resistant to drought, mechanical injury and small floods.

Pollinators for Sacramento prickly poppy were photographed by Malaby (1987). The Bee Biology and Systematics Laboratory collected and identified specimens in 1992 (V. Tepedino, pers. comm., 1993); however, no specific information has been received to date.

Additional studies are needed to determine the biological and habitat requirements of Sacramento prickly poppy. These include: evaluate water requirements in relation to phenology (stages of growth), the role of surface-disturbance in seedling establishment, plant competition, genetic variability within the subspecies, a detailed study of pollinators, seed biology, the role of animal vectors (birds, insects, small mammals) in seed dispersal, demography, reproductive biology, ecology, community structure, insect predation and disease, response to fire, optimal germination techniques, and habitat quantification.

## PART II - RECOVERY

#### Objective and Criteria

The primary objective of this recovery plan is to maintain Sacramento prickly poppy populations in their natural habitat and to ensure that the species is safe from extinction. Due to the present status of the species and unknown nature of its biological and habitat requirements, it is impossible at this time to predict what measures will be sufficient to delist this species.

Even though we cannot determine at this time what will be required for delisting, we believe that the Sacramento prickly poppy can be considered for reclassification, or downlisting, from endangered to threatened. Tasks necessary to accomplish this downlisting should provide the information needed to determine if delisting is possible and what the delisting objectives and criteria should be. After downlisting is accomplished, this plan will be revised to establish specific delisting objectives. The tasks necessary to meet the downlisting objectives are:

- 1. Ensure long-term protection of the populations from human threats on Forest Service, City of Alamogordo, and BLM lands, and on land affected by NMSHD activities. Cooperation among these local, State and Federal agencies is critical to implementing the recovery plan and any additional protective measures necessary to ensure long-term protection for this species. This protection includes designation of special management areas or zones appropriate to each agency. The Service will provide technical advice and assistance needed and funding as available to carry out recovery actions. However, the majority of responsibility for managing, preserving and recovering the Sacramento prickly poppy will fall on the various local, State, and Federal agencies with populations of this species on lands under their jurisdiction.
- 2. Maintain reproducing populations of Sacramento prickly poppy within each of the 10 presently occupied canyons (Dry, Alamo, Caballero, Fresnal, La Luz, Salado, Mule, San Andres, Dog and Escondido canyons) on the western slope of the Sacramento Mountains. Based on the available information, we assume a population to be all the reproductive individuals within a canyon. The maintenance of populations designated for downlisting must be documented through monitoring over at least a 10-year period. Evidence for reproduction during the 10-year period must include the presence of adult,

flowering, and fruiting plants, and the germination and establishment of seedlings. We lack the knowledge at this time to determine the numbers of individuals required to maintain a viable population. However, canyons with low numbers (e.g., 1-18 individuals) require evaluation for the possibility of reintroduction. If population numbers in canyons with larger populations decline, reintroduction may also be required. The need for reintroduction would be most urgent if plants at the upper ends or heads of canyons, which presumably provide seed for the establishment of new locations downstream, were to disappear or die.

- 3. Determine requirements for the germination and establishment of new individuals. It is most important to understand the critical factors that are essential for recruitment in this species. The species may be dependent on disturbance to provide open habitat, bare of other vegetation, for the establishment of seedlings. Alternatively, although there is less evidence for this possibility, the prickly poppy may be able to successfully reproduce in sites with vegetative ground cover where mature plants already exist.
- 4. Study genetic variability within the species. Genetic analysis will provide assistance in determining how many populations are required to maintain that variability.

## Recovery Outline

The following is an outline of the recovery tasks needed to achieve the objectives of this plan. The following section includes more detailed information on individual tasks.

- 1. Protect Sacramento prickly poppy populations and habitat from existing threats and develop management plans.
  - 11. Develop management plans or agreements with landowners to avoid or reduce impacts to Sacramento prickly poppy.
    - 111. Develop management agreement or plan for the City of Alamogordo's water pipeline (ongoing repair, replacement, maintenance).
    - 112. Develop a management plan with the Lincoln National Forest.
    - 113. Develop a management plan or agreement with the BLM.
    - 114. Develop a management plan or agreement with the NMSHTD to protect plants in the Highway 82 right-of-way and other locations affected by their activities.
    - 115. Develop a conservation agreement with private landowners to protect plants on private lands.
  - 12. Enforce applicable Federal and State laws and regulations.
  - 13. Monitor populations for general condition, reproductive success, and to determine any needed revisions of management plans or agreements to protect the species.
  - 14. Evaluate and revise management agreements or plans as needed to ensure continued protection for the species.
- Conduct studies to gather information on the habitat and biological requirements of the species.
  - 21. Determine habitat requirements.
    - 211. Geologic and edaphic and microclimate profile
      - 2111. Geology
      - 2112. Soils
    - 212. Water requirements
    - 213. Plant community characteristics
    - 214. Community dynamics and ecology
      - 2141. Requirements for establishment of new individuals
      - 2142. Seral stage
      - 2143. Response to grazing
      - 2144. Response to other surface-disturbing activities

- 2145. Beneficial, neutral, and negative interactions with other species
- 22. Study reproductive biology.
  - 221. Determine types of reproduction and contribution to the population.
  - 222. Investigate pollination biology.
  - 223. Investigate seed production and dispersal methods.
  - 224. Characterize phenology and determine the most vulnerable stages of the life cycle.
- 23. Study population biology.
  - 231. Determine numbers of individuals, seedling recruitment and survival, and longevity of individuals and populations.
- 24. Study population genetics by collecting adequate samples from plants in each canyon to determine the range of genetic variability and the extent of populations.
- 25. Determine requirements for maintaining populations.
  - 251. Evaluate information on ecological requirements for establishment of new populations, and maintenance of existing populations.
  - 252. Evaluate information on requirements for maintaining genetic variability and maintaining adequate population numbers for long-term survival of the species.
  - 253. Evaluate current management and assess its adequacy for meeting ecological, genetic, and population requirements of the species.
  - 254. Make recommendations for any required changes in management.
- 26. Collect seed for storage and study of cultivation requirements.
  - 261. Seed biology
  - 262. Germination requirements
  - 263. Seedling biology
  - 264. Investigate other propagation techniques.
- 3. Search for and survey potential habitat.
  - 31. Search for areas with potential habitat.
  - 32. Survey known potential habitat on the Mescalero Apache Reservation.
  - 33. Search for potential restoration sites.

- 4. Evaluate restoration feasibility.
  - 41. Evaluate available reintroduction techniques.
  - 42. Establish a study site for potential reintroduction.
  - 43. Determine the feasibility of a reintroduction program.
- 5. Develop and implement a reintroduction plan, if feasible.
- 6. Encourage public concern and support for the preservation and study of Sacramento prickly poppy.
- 7. Develop a post-recovery monitoring plan.

# Narrative Outline of Recovery Actions

- 1. Protect Sacramento prickly poppy populations and habitat from existing threats and develop management plans. Given the small number of populations and known individuals, and the relatively small geographic area of known occurrence, Sacramento prickly poppy is vulnerable to extinction. Little is known about the habitat and biological requirements of this species. Therefore, it is necessary to preserve all currently occupied habitats by avoiding or reducing impacts to these populations through management agreements or plans with the land-managing agencies.
  - 11. Develop management plans or agreements with land-managing agencies to avoid or reduce impacts to populations of Sacramento prickly poppy. Sacramento prickly poppy plants occur primarily on land under the jurisdiction of the Forest Service and to a lesser degree on lands managed by the BLM, City of Alamogordo, NMSHTD, and private individuals. The development of management plans or agreements with these various Federal and State agencies could reduce or avoid impacts to the Sacramento prickly poppy.
    - 111. Develop a management agreement or plan for the City of Alamogordo's water pipeline (ongoing repair, replacement, maintenance, and water availability). This will avoid and reduce impacts to plants and populations located within the Alamo Canyon system (including Caballero and Gordon canyons) and the Fresnal Canyon system (including La Luz Canyon). The plan should also include mapping all Sacramento prickly poppy locations within the water pipeline right-of-way, population counts every 2 years, and allowing water to remain in the stream channels whenever possible. The City should also protect plants or populations occurring on other City lands.
    - 112. Develop a management plan with the Lincoln National
      Forest. The Lincoln National Forest has a draft
      management plan for Sacramento prickly poppy. This plan
      should be updated and finalized. This would include:
      long-term monitoring of populations to evaluate the
      impacts of livestock grazing and trampling, and off-road
      vehicles, in addition to the mapping of all known plants

- on U.S. Geological Survey 7½ minute maps and population counts every 2 years.
- 113. Develop a management plan or agreement with the BLM. The BLM has a few populations located west of Forest Service lands. The plan should include: long-term monitoring of these populations to evaluate the impacts of livestock grazing and trampling, and off-road vehicles, in addition to the mapping of all known plants on U.S. Geological Survey 7½ minute maps and population counts every 2 years.
- 114. Develop a management plan or agreement with the NMSHTD to protect plants in the Highway 82 right-of-way and other locations affected by their activities. This plan should include flagging of all plants in the highway right-of-way with permanent markers. The NMSHTD should inform contractors that this is a federally protected plant and ensure that they do not destroy or impact plants during annual maintenance activities.
- 115. <u>Develop a conservation agreement with private landowners</u>
  <u>to protect plants on private lands</u>. Agencies should work
  with private landowners toward voluntary protection of
  plants on private lands by encouraging landowners to
  avoid land-use practices that are detrimental to this
  species and its habitat. Landowners should also be made
  aware of opportunities for economic assistance through
  programs like Partners for Wildlife and conservation
  agreements with the Service.
- 12. Enforce existing Federal and State laws and regulations. All existing laws need to be enforced. These laws include the Endangered Species Act, the New Mexico Endangered Plant Species Act, the Lacey Act, the National Forest Management Act, and the National Environmental Policy Act. The Service should encourage the Mescalero Apache Tribe to include protection of this species in their Tribal code if the plant is found on their land.
- 13. Monitor populations for general condition, reproductive success, and to determine any needed revisions of management

plans or agreements to protect the species. The monitoring of individual populations should occur at least every 2 years. Monitoring methods should be coordinated between the various Federal agencies and the City of Alamogordo, and comparisons should be made between populations to differentiate normal fluctuation from conditions of stress or decline.

- Evaluate and revise management agreements or plans as needed 14. to ensure continued protection for the species. As biological and habitat information becomes available for the Sacramento prickly poppy, it should be incorporated into management Evaluation and revision of plans should be strategies. coordinated among all land managers to take advantage of all available information and expertise. If monitoring data demonstrate unacceptable decline in the conditions of populations, this should be brought to the attention of all parties involved in conservation planning. Coordinated, wellthought-out management strategies should be developed for a quick and effective response. All known populations should be monitored to determine if management plans are accomplishing the desired goals. In some instances, long-term monitoring can be accomplished through annual photographs from existing fixed photo points.
- 2. Conduct studies to gather information on the habitat and biological requirements of the species. Our scientific understanding of the biology of Sacramento prickly poppy is cursory and based predominantly on qualitative observations. This has limited efforts to define habitat and management needs for the species. Additional studies are necessary to identify the critical parameters of habitat, growth, and reproduction for this species.
  - 21. <u>Determine habitat requirements</u>. This information is essential to ensure continued survival of existing populations. It will also aid in the effort to locate any additional existing populations and appropriate areas for potential reintroduction efforts.
    - 211. <u>Geologic and edaphic profile</u>. The basic physical factors that make up the environment of Sacramento prickly poppy are poorly understood and need to be documented in a detailed and quantitative manner.

- 2111. Geology. Historical information indicates that at one time this species occurred on an igneous substrate. All the currently known sites occur on sedimentary substrates. The geological requirements of this species should be determined.
- 2112. Soils. Little is known about the soil requirements of this species. The Soil Conservation Service soil survey for Otero County does not include detailed information on soils that support Sacramento prickly poppy populations. An understanding of the soil characteristics for Sacramento prickly poppy habitat will provide additional information on the requirements of this species.
- 212. Water requirements. Various botanists have indicated that moisture-enhanced sites are favorable for the establishment of Sacramento prickly poppy. Older plants occur in xeric upland sites and appear to be independent of surface water, although subsurface moisture in canyons and arroyo locations appears to be critical to the survival of mature plants. Water requirements of this species should be investigated and integrated into agency and City agreements.
- 213. Plant community characteristics. Detailed, quantitative characterizations of the community structure in areas where Sacramento prickly poppy occurs have never been done. Associated species should be documented for all populations, including quantitative measures of cover, density, and frequency, to obtain a profile of the diagnostic species. This information is necessary for understanding the dynamics and management needs of the populations, refining the search for new populations, and evaluating the potential for reintroduction efforts. This is also essential baseline data in evaluating the present condition of populations and determining management needs over time.
- 214. Community dynamics and ecology. Little is known about the dynamic processes that shape the habitat of the

Sacramento prickly poppy, including the causes of the disturbed and open areas where seedlings are found, successional stages of the communities in which it occurs, and interactions with other species. A basic knowledge of processes and interactions is important for maintenance and restoration, as well as assessment of the feasibility of reintroduction.

- 2141. Requirements for establishment of new individuals. The critical environmental factors for reproduction need to be understood, including the processes that create suitable areas and circumstances for recruitment of new individuals; if the plants are dependent on a disturbance regime, these processes might include flash floods, erosion, or fire.
- 2142. <u>Seral stage</u>. While it appears likely that the community in which Sacramento prickly poppy occurs is an early seral vegetative stage, this has never been documented. Information about successional status of the community, its relative seral stage, and expected longevity of vegetation phases is needed.
- 2143. Response to grazing. Under high stocking rates, cattle were observed grazing Sacramento prickly poppy plants to the ground. However, grazing is apparently not a problem under normal range conditions and with lower stocking rates.

  Trampling is associated with grazing and may be detrimental to Sacramento prickly poppy seedlings. The long-term impacts to Sacramento prickly poppy populations from trampling are poorly understood. Consistent and long-term monitoring should be conducted to evaluate grazing impacts to the species. Secondary effects on the prickly poppy from grazing (e.g., habitat alteration and degradation) should be documented.
- 2144. Response to other surface-disturbing activities.

  In designing maintenance and long-term management

strategies for the species, it is necessary to anticipate the response of the plant to various management actions that involve surface disturbance (off-road vehicles, road construction and maintenance, water pipelines). Comparative observation of the known populations and their history of land use and management would be helpful in providing at least preliminary indications of the effects of surface disturbances and land use practices.

- 2145. Beneficial, neutral, and negative interactions with other species. Some species may have a positive interaction with Sacramento prickly poppy (such as providing a shelter for germinating seedlings), while negative interactions (such as insect predation) may also occur. The positive, negative, or neutral impacts of other species in the community need study. Provision for these influences need to be made in the management plans.
- 22. <u>Study reproductive biology</u>. Reproduction, from flowering to the germination and establishment of new plants (including mechanisms, processes, and necessary agents), needs to be understood for successful management, and possible cultivation and restoration.
  - 221. <u>Determine the types of reproduction and contribution to the population</u>. The breeding strategies of Sacramento prickly poppy are unknown. The capability for and occurrence of self-pollination, insect-mediated self-pollination, and other possible breeding scenarios need to be determined, as well as the potential for asexual propagation.
  - 222. <u>Investigate pollination biology</u>. No detailed and quantitative studies on insect pollinators and pollen viability have been done to date. A detailed study of insect visitation, pollination, pollinator efficiency, pollen predation, and other aspects of pollination

- biology are needed to determine if any of these factors are reducing normal fruiting.
- 223. Investigate seed production and dispersal methods. Seed production and viability need to be determined, as well as the mechanisms and distance of dispersal. Seeds usually remain within close proximity to the parent plant. Factors influencing fruit set and maturation have not been established. This work should continue for several seasons (through a variety of conditions), and be expanded to examine dispersal mechanisms and distances. The role of animals in seed dispersal (birds, rodents, and insects) should be evaluated. Some botanists have observed Sacramento prickly poppy plants occurring away from and outside of drainage areas and speculated that animals may play a role in seed dispersal.
- 224. Characterize phenology and determine the most vulnerable stages of the life cycle. Developmental observations of phenology throughout the field season have not been documented. This should be done for several seasons covering the spectrum of climatic variation. The resulting record should be compared to local climatic data (temperature and precipitation) to determine correlation. With a record of phenology, corrected for climatic fluctuations, an evaluation should be made of any stages in the life cycle that are critical and consistently impaired, any known causes, and management recommendations.
- 23. <u>Study population biology</u>. Investigate the current demographic status of the species.
  - 231. Determine numbers of individuals, seedling recruitment and survival, and longevity of individuals and populations. Because of gaps in our knowledge, targets for numbers of individuals and desired proportion of individuals in various life stages needed to maintain populations are difficult to establish. A study of these population characteristics will yield necessary information for future management.

24. Study population genetics by collecting adequate samples from plants in each canyon to determine the range of genetic variability and the extent of populations. For the purposes of this plan, we have considered that plants in each canyon represent separate populations. However, insect-pollination, long-distance seed dispersal, and other factors may facilitate gene flow between canyon groups. Adequate sampling of plant material from plants throughout the range of the species will assist in understanding what groups of plants actually make up populations. This information is critical to proper management of the species.

#### 25. Determine requirements for maintaining populations.

- 251. Evaluate information on ecological requirements for establishment of new populations and maintenance of existing populations. Synthesize information collected on habitat, dynamic processes, and biological characteristics of the species to determine requirements for reproduction and survival. The information collected should lead to conclusions about the species' requirements for reproductive success. Observations indicate that the species depends on transient disturbance conditions that create bare, open, moist, areas for germination. It is possible that germination and recruitment can also take place in an alternative situation (although it has not been observed), where there is successful establishment of seedlings in sites where mature plants already exist with vegetative ground cover.
- 252. Evaluate information on requirements for maintaining genetic variability and maintaining adequate population numbers for long-term survival of the species. Genetic analysis will provide assistance in determining how many populations are required to maintain that variability.
- 253. Evaluate current management and assess its adequacy for meeting ecological, genetic, and population requirements of the species. Synthesize information gathered from tasks described in this plan, and develop goals for numbers of individuals and populations necessary to

maintain the genetic variability of the species and to ensure its long-term survival. Current management may not be adequate to meet these goals.

- 254. Make recommendations for any required changes in management. Recommend changes based on assessment of adequacy of existing management to meet the needs of the species.
- One seed germination experiment found that a combination of scarification and stratification enhanced germination.

  Additional studies are needed to determine the exact cultivation requirements prior to the establishment of a successful management program for both natural and potential cultivated populations.
  - 261. <u>Seed biology</u>. Attributes such as average seed proportions per plant, viability, longevity, type of dormancy (embryonic, testa, and combination of both) and factors inducing and breaking dormancy need to be determined, both for field conditions and possible horticultural cultivation.
  - 262. Germination requirements. Additional work is needed to determine optimal conditions and range of tolerance for germination in the field and cultivation (including seasonality, soil depth, temperature and moisture, light, and pretreatments such as scarification and coldstratification).
  - 263. <u>Seedling biology</u>. Light, temperature, moisture, and nutrient requirements for seedling establishment (attaining independence from seed reserves and making the transition toward independent nutrition and growth) need to be understood. Threats to seedling establishment after germination (disease or predation) must be evaluated and addressed for successful cultivation and restoration techniques to be developed.
  - 264. <u>Investigate other propagation techniques</u>. Cultivation from seed has been demonstrated, but production of seed

for possible cultivation may be laborious. Other techniques should be investigated. Propagation, if properly handled, may be used for the multiplication of selected genotypes to meet potential reintroduction program needs.

- 3. <u>Search for and survey potential habitat</u>. Additional inventory work for existing populations is needed, and as information about habitat requirements becomes known, a search should be made of potential sites for reintroduction.
  - 31. <u>Search for areas with potential habitat</u>. Identify areas on Federal, State and private land with potential habitat that have not been surveyed.
  - 32. Survey potential habitat on the Mescalero Apache Reservation.

    Although the Mescalero Apache Reservation is known to have potential habitat for Sacramento prickly poppy, it is not clear how much effort has been expended to survey these areas. In cooperation with the Mescalero Apache Tribe, additional surveys should verify whether this taxon occurs on Tribal lands.
  - 33. <u>Search for potential restoration sites</u>. Understanding the habitat requirements of Sacramento prickly poppy will also aid in locating suitable restoration sites that meet the natural habitat and distribution criteria for this species.
- 4. Evaluate restoration feasibility. An evaluation of the need and potential for reintroduction of the species can be made when more information is available about the possibility of overlooked populations, genetic viability, population stability, habitat availability, long-term management requirements of the community, and success of cultivation. In the event that reintroduction is to be attempted, the following recovery actions (tasks 41, 42, and 43) should be implemented.
  - 41. Evaluate available reintroduction techniques. Evaluate the relative success of different cultivation, site preparation, planting, and management techniques available, based on research and monitoring data. Assess any additional informational needs and readiness to attempt reintroduction. Develop initial reintroduction guidelines.

- 42. Establish a study site for potential reintroduction. Using the guidelines developed above, design and implement a pilot program to meet informational needs and test methods.
- 43. <u>Determine the feasibility of a reintroduction program</u>. Assess results of the above program and determine the potential for reintroduction.
- 5. Develop and implement a reintroduction plan, if feasible. Based on the assessment of the pilot program, a reintroduction plan should be developed and implemented that provides for all phases, including plant propagation, site selection, site preparation, introduction, establishment (to independent existence), monitoring, and short—and long-term management strategies. The plan will describe criteria that must be met for a reintroduced population to be considered successful.
- 6. Encourage public concern and support for the preservation and study of Sacramento prickly poppy. A broad-based awareness of the species, and support for recovery efforts, need to be developed. This is particularly important for maintaining existing populations under the care of various land managers and in efforts to locate or possibly introduce additional populations. However, the perception that prickly poppies are generally weeds may make this difficult. Environmental groups, endangered species organizations, garden clubs, native plant societies, and horticultural enthusiasts may also play a role in encouraging and fostering cooperation in the preservation of this species. Local and regional appreciation can be furthered through the use of personal meetings, as well as presentations before groups and in the local media. Larger audiences are best reached through the educational system and printed and visual media with national distribution.
- 7. <u>Develop a post-recovery monitoring plan</u>. If recovery is determined to be feasible, a coordinated monitoring plan should be developed that will track the condition of natural and introduced populations for at least 5 years after delisting, as required by the 1988 amendments to the Act. Responsibilities for implementation and reporting should be delineated. This plan should specify types and levels of decline that would trigger intervention.

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#### PART III - IMPLEMENTATION SCHEDULE

The following implementation schedule outlines actions and estimated costs for the Sacramento prickly poppy recovery program. It is a guide for meeting the objectives discussed in Part II of this Plan. The schedule indicates task priorities, task numbers, task descriptions, duration of tasks, responsible agencies, and estimated costs. These actions, when accomplished, should bring about the downlisting of the Sacramento prickly poppy and protect its habitat. It should be noted that the estimated monetary needs for all parties involved in the recovery are identified for the first 3 years only. The estimated costs are intended to assist in long-range planning. This recovery plan does not obligate any involved agency to expend the estimated funds. Though work with private landowners is called for in the recovery plan, private landowners are not obligated to expend any funds for the recovery of this species.

#### Task Priorities

- Priority 1 An action that <u>must</u> be taken to prevent extinction or to prevent the species from declining irreversibly in the <u>foreseeable</u> future.
- Priority 1\* An action that by itself will not prevent extinction or an irreversible decline, but which is necessary to carry out a task that is a priority 1 as defined above.
- Priority 2 An action that must be taken to prevent a significant decline in species population/habitat quality, or some other significant negative impacts short of extinction.
- Priority 3 All other actions necessary to meet the recovery objectives.

#### Abbreviations Used

- ES U.S. Fish and Wildlife Service, New Mexico Ecological Services State Office
- LE Law Enforcement (FWS, FS, BLM)
- LNF Lincoln National Forest
- BLM Bureau Land Management
- COA City of Alamogordo
- NM New Mexico Energy, Minerals and Natural Resources
  Department
- MAT Mescalero Apache Tribe
- NMSH New Mexico State Highways and Transportation Department
- SCS Soil Conservation Service
- BBSL USDA Bee Biology and Systematics Laboratory, Logan, Utah

# RECOVERY PLAN IMPLEMENTATION SCHEDULE

			TASK	RESPONSIBLE PARTY			COST ESTIMATES (\$000)			
PRIOR-	TASK	TASK DESCRIPTION	DURA- TION (YRS)	FWS				VEAD 2	YEAR 3	COMMENTS
ITY #	#			Region	Program	Other	YEAR 1	YEAR 2	YEAR 3	
1	111	Develop management plan with City of Alamogordo	3	2	ES		5.0	5.0	5.0	
1	112	Develop management plan with Lincoln National Forest	2	2	ES		5.0	5.0		
1	113	Develop management plan with BLM	2	2	ES		5.0	5.0		
1	114	Develop management plan with New Mexico State Highways and Transportation Department	2	2	ES	LNF	3.0 4.0	2.0		
1	115	Develop conservation agreement with private landowners	3	2	ES	LNF BLM	5.0 5.0 5.0	5.0 5.0 5.0	5.0 5.0 5.0	
1	12	Enforce existing laws	ongoing	2	ES LE	LNF BLM NM	2.0 1.0 5.0 3.0 5.0	2.0 1.0 5.0 3.0 5.0	2.0 1.0 5.0 3.0 5.0	
1	2141	Study requirements for establishment of new plants	5	2	ES		5.0	3.0	3.0	
1	2142	Determine seral stage	3	2	ES	ļ	2.5	2.5	2.5	
1	2143	Study grazing impacts	3	2		LNF BLM	10.0 10.0	5.0 5.0	3.0 3.0	
1*	23	Study population biology	5	2	ES	<b> </b>	5.0	5.0	5.0	
1*	13	Monitor populations	ongoing	2	ES	COA LNF BLM NMSH MAT	2.0 5.0 5.0 3.0 2.5 1.0	2.0 5.0 5.0 3.0 2.5 1.0	1.0 5.0 5.0 3.0 2.5 1.0	

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			TASK	RESPONSIBLE PARTY			COST ESTIMATES (\$000)			
PRIOR-	TASK #	TASK DESCRIPTION	DURA- TION (YRS)	F	ws	Other	YEAR 1	YEAR 2	YEAR 3	COMMENTS
ITY #				Region	Program					
1*	14	Revise management plans as needed	ongoing	2	ES	COA LNF BLM NMSH	5.0 5.0 5.0 5.0 2.5	5.0 5.0 5.0 5.0 2.5	5.0 5.0 5.0 5.0 2.5	
2	2144	Evaluate response to other surface-disturbing activities	5	2	ES	LNF BLM COA NM	5.0 5.0 5.0 5.0 5.0	4.0 4.0 4.0 4.0 4.0	3.0 3.0 3.0 3.0 3.0 3.0	
2	2145	Determine species interactions	5	2	ES	COA LNF BLM	5.0 5.0 5.0	3.0 3.0 3.0 3.0	2.0 2.0 2.0 2.0	
2	3	Survey potential habitat	2	2		MAT	5.0	5.0	5.0	
2	211	Study geologic and edaphic profile	2	2	ES	LNF BLM	1.0 1.0 1.0	1.0 1.0 1.0	1.0 1.0 1.0	
2	212	Study water requirements	5	2	ES	LNF BLM COA	5.0 5.0 1.0	2.0 2.0 1.0	2.0 2.0 1.0	
2	213	Determine plant community characteristics	2	2	ES		1.0	0.5	5.0	
2	24	Study genetic variability	3	2		NM	5.0	5.0	5.0	
2	224	Characterize phenology	2	2		NM	3.0	2.0	2.5	

# RECOVERY PLAN IMPLEMENTATION SCHEDULE

PRIOR- ITY #	TASK	TASK DESCRIPTION	TASK DURA- TION (YRS)	RESP	ONSIBLE PA	RTY	COST EST			
				I	rws	Other	YEAR 1	YEAR 2	YEAR 3	COMMENTS
	#			Region	Program					
2	221	Study types of reproduction	2	2	ES		5.0	3.0		
2	222	Study pollination biology	1	2		BBSL	5.0	<u></u>	<u> </u>	
2	223	Study seed production and dispersal methods	2	2	ES	<u> </u>	<u> </u>	2.0	2.0	
2	23	Study population biology	5	2	ES		2.0	2.0	2.0	
2	261	Study seed biology	5	2	ES	<b> </b> .	2.0	2.0	2.0	
2	262	Study germination requirements	2	2	ES		2.5	2.5		
2	263	Study seedling biology	2	2	ES		2.5	2.5	5.0	
2	264	Study propagation techniques	2	2	ES		3.0	2.0		· · · · · · · · · · · · · · · · · · ·
2	33	Study potential restoration sites	2	2	ES	LNF	5.0 5.0	5.0 5.0		
2	41	Evaluate reintroduction techniques	2	2	ES		5.0	5.0		
3	42	Establish pilot reintroduction program	2	2	ES	LNF	5.0 10.0	1.0 2.0		
3	43	Determine feasibility of reintroduction	10	2	ES		1.0	1.0	1.0	
3	5	Develop a reintroduction program	2	2	ES		10.0	5.0	5.0	

#### RECOVERY PLAN IMPLEMENTATION SCHEDULE

PRIOR- ITY #	TASK	TASK DESCRIPTION	TASK DURA- TION (YRS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)			
				FWS		]				COMMENTS
				Region	Program	Other	YEAR 1	YEAR 2	YEAR 3	
3	6	Develop public concern and support	ongoing	2	ES	LNF BLM COA NM	2.0 2.0 2.0 2.0 20.0	2.0 2.0 2.0 2.0 2.0	2.0 2.0 2.0 2.0 2.0	
3	25	Determine requirements for monitoring population	,	2	ES			,		Evaluate informa- tion gathered in other tasks
3	7	Develop a post recovery monitoring plan	5	2	ES	LNF BLM COA NM	5.0 10.0 5.0 5.0 5.0	5.0 5.0 5.0 5.0 5.0	5.0 5.0 5.0 5.0	

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#### APPENDIX

# Technical Reviewers

The following individuals provided comments on preliminary drafts of this plan:

Renee Galeano-Popp, U.S. Forest Service (USFS), Alamogordo, New Mexico Don DeLorenzo, USFS, Alamogordo, New Mexico Theresa Prendusi, USFS, Albuquerque, New Mexico Laura Huenneke, New Mexico State University, Las Cruces, New Mexico Ann Evans, University of New Mexico, Albuquerque, New Mexico Tom Wooten, Committee of Wilderness Supporter, Inc. Sacramento Grazing Association, Weed, New Mexico Rick Lessentine, Tularosa, New Mexico

# Principal Comments Received on the Draft Sacramento Prickly Poppy Recovery Plan and Service Responses

Availability of a draft recovery plan for the Sacramento prickly poppy for review and comment was published in the <a href="Federal Register">Federal Register</a> (Vol. 56, No. 51) on March 16, 1994. The public comment period ended May 16, 1994.

There were 10 requests for copies of the Sacramento prickly poppy draft recovery plan. Five letters were received: two from Federal agencies, one from a grazing association, one from a conservation organization, and one from a professor of biology. Substantive comments that questioned approach, methodology, or financial needs identified in the draft plan, or suggested changes to the plan, are discussed below. Comments related to the original decision, or regarding the Act and not related to the Sacramento prickly poppy, were not included. Supportive documents were also received.

All comments received were considered when revising the draft plan, and retained as a part of the Administrative Record for the Sacramento prickly poppy at the New Mexico Ecological Services State Office.

Comment: The draft plan is well written, concise, and comprehensive. The commentors concurred that basic research on the ecological requirements of the species is needed, and should be included in the plan as priority 1 tasks.

Service Response: The Service believes that this species can be downlisted after the tasks in this plan are performed, and that basic research will provide the information necessary to set recovery goals for the Sacramento prickly poppy.

Comment: The draft plan included numerical goals for the Sacramento prickly poppy that would be impossible to attain without additional knowledge of the species' biology.

Service Response: The Service believes that the final plan describes tasks that will lead to downlisting and to the information necessary to establish recovery goals appropriate to the species' biology. Specific numerical goals are not included in this final recovery plan.

Comment: Artificial propagation and reintroduction of plants into previously occupied habitat or into canyons where numbers are low may be required to prevent extinction.

Service Response: The plan recommends collecting seed for germination and seedling biology studies, and reintroducing plants into suitable locations.

Comment: Areas along the west side of the Sacramento Mountains should be protected from various activities to assist in the downlisting and recovery of the species.

Service Response: The plan recommends that agencies develop management plans to aid in protection and recovery of the Sacramento prickly poppy.

Comment: The draft plan states that disturbance may be required for successful establishment of new populations or locations for the Sacramento prickly poppy, and also states that disturbance is a threat.

Service Response: The final plan calls for studies to provide managers with an understanding of the intensity and type of disturbance required to provide opportunities for the establishment of new individuals. However, surface disturbance that destroys adult, reproducing individuals should be avoided.

Comment: Water in streams has been diverted into pipeline systems along the west slope of the Sacramento Mountains and the consequent drying of riparian areas has been detrimental to the prickly poppy.

Service Response: The final recovery plan calls for understanding the water requirements of the species as part of the information required for establishing management and recovery goals.

Comment: There is no proof that cattle grazing affects the Sacramento prickly poppy.

Service Response: Cattle grazing on the poppy has been observed by biologists over the years. The USFS has established monitoring plots to determine the effect of cattle on seedlings. The final recovery plan requires study of the effect of cattle grazing on adult and juvenile Sacramento prickly poppies.