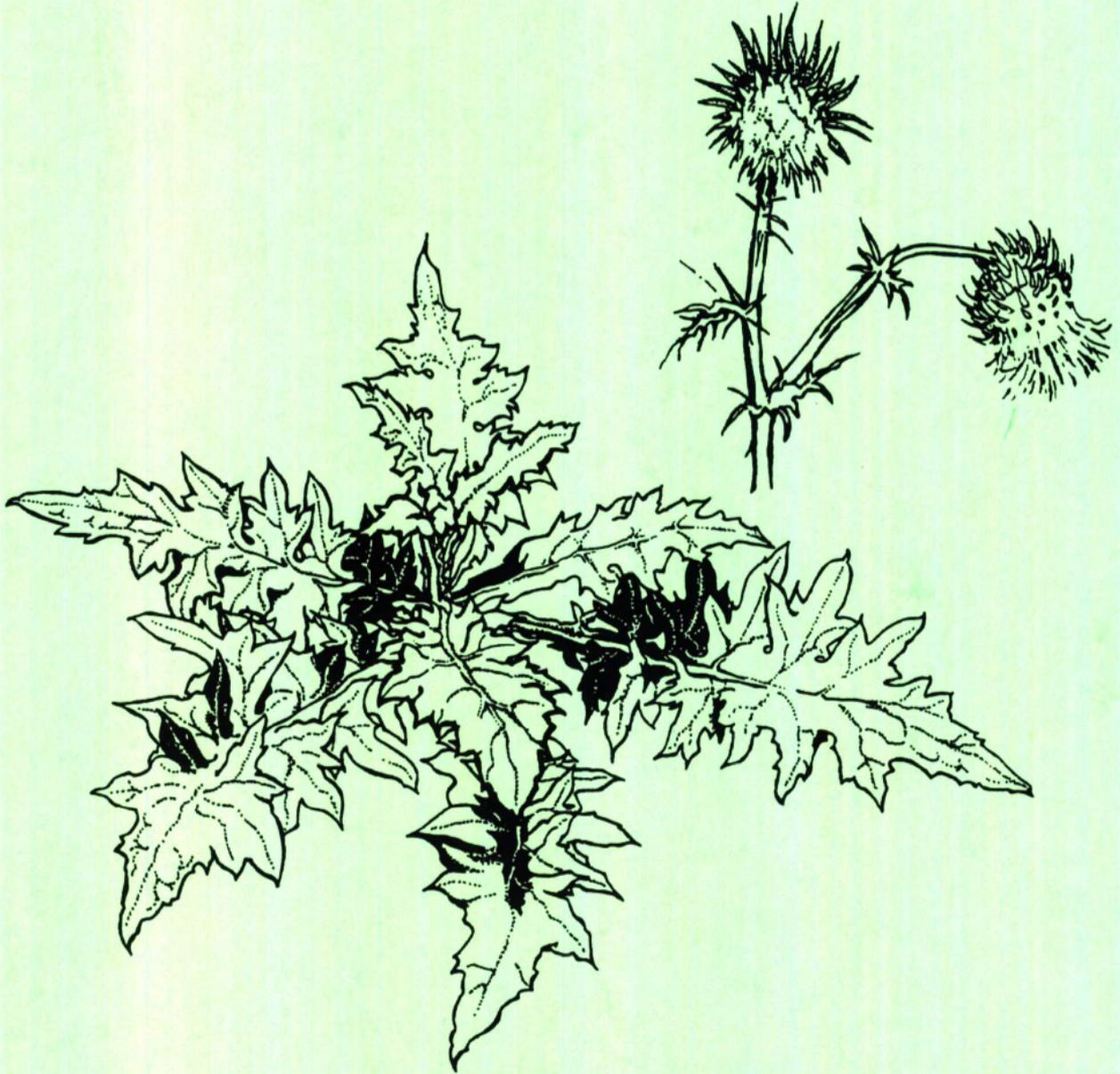


Sacramento Mountains Thistle
(Cirsium vinaceum)
Recovery Plan



U.S. FISH AND WILDLIFE SERVICE
ALBUQUERQUE, NEW MEXICO
1993

SACRAMENTO MOUNTAINS THISTLE

(Cirsium vinaceum)

RECOVERY PLAN

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for
Region 2
U.S. Fish and Wildlife Service
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Approved:



Regional Director, U.S. Fish and Wildlife Service

Date:

10/1/02

DISCLAIMER

Recovery plans delineate reasonable actions that are believed to be required to recover and/or protect listed 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 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 or Director as approved. Approved recovery plans are subject to modification as dictated by new findings, changes in species' status, and completion of recovery tasks.

Literature Citations should read as follows:

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PART I - INTRODUCTION

Brief Overview

The Sacramento Mountains thistle (Cirsium vinaceum Wooton & Standley) was listed as a threatened species under the Endangered Species Act of 1973 (Act), as amended, on June 16, 1987 (U.S. Fish and Wildlife Service 1987). This plant is known only from the Sacramento Mountains of south-central New Mexico. It was originally discovered in 1899 by E. O. Wooton near Fresnal, New Mexico. The population at the type locality has since been extirpated by agricultural activities. The remaining populations are mostly on the Lincoln National Forest in mixed conifer/mountain meadow associations. They always occur in wetlands or subirrigated areas associated with springs, streams, and seeps. The Sacramento Mountains thistle is threatened by water diversion at spring habitats, direct and indirect impacts from grazing, competition with exotic plant species, logging, and recreation. The recovery priority number for Sacramento Mountains thistle is 2. Recovery priority numbers range from 1 to 18, with species ranking 1 having the highest recovery priority.

Taxonomy

The type specimen for Cirsium vinaceum is in the U.S. National Herbarium, No. 690246, from "the Sacramento Mountains near Fresnal" (Wooton and Standley 1913). It was originally named Carduus vinaceus in accordance with generic concepts at that time. Wooton and Standley (1915) later combined it with the genus Cirsium where it was maintained by Petrak (1917) in his revision of the North American species of Cirsium. Although Cirsium is a common genus in the New Mexico flora, Cirsium vinaceum is a distinctive species with no close relatives within its range of occurrence. Its closest relative is the Mexican species, Cirsium conspicuum.

Morphology

The Sacramento Mountains thistle is a stout biennial, 1-1.8 meters (3.3-5.9 feet) tall, with many ascending, brown-purple branches. The basal leaves are green, not hairy, 30-50 centimeters (12-20 inches) long, up to 20 centimeters (8 inches) wide, ragged edged, and divided nearly to the midrib, the divisions tipped with slender yellow spines. Flowering heads are 5 centimeters (2 inches) in diameter and almost as high, numerous at the ends of branches, naked, and bell-shaped; involucre bracts are of several ranks, deep red-purple, bent back at about the middle, and tipped with short yellowish spines. Flowers are pink-purple; the fruits or achenes are obovate, brown, and glabrous, with a tawny plumose pappus 15-20 millimeters (0.6-0.8 inches) long.

Distribution and Abundance

The Sacramento Mountains thistle occurs mostly on U.S. Forest Service (Forest Service) lands of the Lincoln National Forest in the Sacramento Mountains of south-central New Mexico within a range of approximately 150 square miles or four townships (Figure 1). There are occupied habitats on private and Mescalero Apache lands in the same general area. However, the Forest Service is the principal land management agency within the range of this species.

When the U.S. Fish and Wildlife Service (Service) determined that the Sacramento Mountains thistle was a threatened species (U.S. Fish and Wildlife Service 1987), there were 20 known population areas (within six large canyon drainages) with an estimated 10,000 to 15,000 sexually reproducing individuals. Since that original estimate, 62 sites (mostly subdivisions of the original 20 populations) on a total of 77 acres of suitable habitat have been documented by the Service (U.S. Fish and Wildlife Service 1988). Of the 58 sites located on the Lincoln National Forest, the Forest Service estimates at least 49,000 plants grow on a total of 66 acres. Since this plant is capable of adventitious reproduction by root sprouting, the Forest Service density estimate of individual plants is derived from the total number of rosettes divided by four. Therefore, a total of 196,000 rosettes (juvenile and mature) were counted during the 1990 inventory. Populations that have been closely monitored appear to be somewhat stable in terms of mortality and recruitment (Thomson and Huenneke 1990a). Three additional sites occur on Mescalero Apache land. One site is on private property.

There are several places within the Cloudcroft and Mayhill Ranger Districts of the Lincoln National Forest with spring habitats that appear suitable for Sacramento Mountains thistle, but are presently unoccupied.

Habitat

The Sacramento Mountains thistle is a riparian plant that requires saturated soils at springs, seeps, and streams. These occupied wetlands are unique in their calcium carbonate content. As the groundwater reaches the surface, the change in pressure and temperature precipitates the calcium carbonate onto organic materials. Over time, large areas of travertine deposits are created at the spring sources that occasionally become large bluffs or hills (up to 0.8 hectares or 2 acres). These continuously wet travertine deposits are the most common habitats of the Sacramento Mountains thistle (Thomson and Huenneke 1990b). Wet areas downstream from these features are often sparsely inhabited by this thistle. A few valley bottoms with wet calcareous soils, such as Scott Able Canyon and Silver Springs Canyon, are occupied by very large populations.

Occupied Sacramento Mountains thistle habitats occur between 7,500 and 9,500 feet in elevation and are typically meadows and streams with steep

EXECUTIVE SUMMARY

Current Status: The Sacramento Mountains thistle (*Cirsium yinaceum*), listed as threatened, occurs or has occurred at about 62 springs and streams in the Sacramento Mountains of south-central New Mexico.

Habitat Requirements and Limiting Factors: The Sacramento Mountains thistle occurs only on wet deposits of travertine (calcium carbonate) in meadows and springs at high elevations in the Sacramento Mountains. Major threats to this species include water development, direct and indirect impacts from grazing, road building, recreation, logging, and the invasion of exotic plants.

Recovery Objective: Delisting.

Recovery Criteria: Acquire water rights for the sole purpose of protecting at least 30 percent of the occupied spring habitats. Develop and implement management plans that will encourage Sacramento Mountains thistle growth for at least 75 percent of the known occupied habitat. Establish a 10-year monitoring and research program to demonstrate the effectiveness of the management plan.

Major Actions Needed:

1. Develop and implement a policy for spring development on Lincoln National Forest and acquire water rights to springs if instream-flow legislation is ever passed in New Mexico.
2. Implement livestock management practices to protect plants and their associated spring and riparian habitats.
3. Implement logging practices that minimize indirect hydrologic and erosional effects on Sacramento Mountains thistle habitat.
4. Study impacts of exotic plant competitors and biological controls.
5. Conduct long term monitoring to evaluate effectiveness of management.
6. Other (genetic studies, locate new populations, managing recreation activities, education, law enforcement).

Year	Need 1	Need 2	Need 3	Need 4	Need 5	Need 6	Total
1993	24	40	40	30	25	98	257
1994	18	25	31	30	25	92	221
1995	18	25	41	30	25	82	221
1996	18	20	4	15	15	21	93
1997	18	20	4	15	15	21	93
1998	18	10	4	0	15	15	62
1999	18	10	4	0	15	15	62
2000	18	10	4	0	15	15	62
2001	18	10	4	0	15	15	62
2002	18	10	4	0	15	15	62
Recovery Cost	186	180	140	120	180	389	1195

Date of Recovery: Delisting could occur as early as 2002.

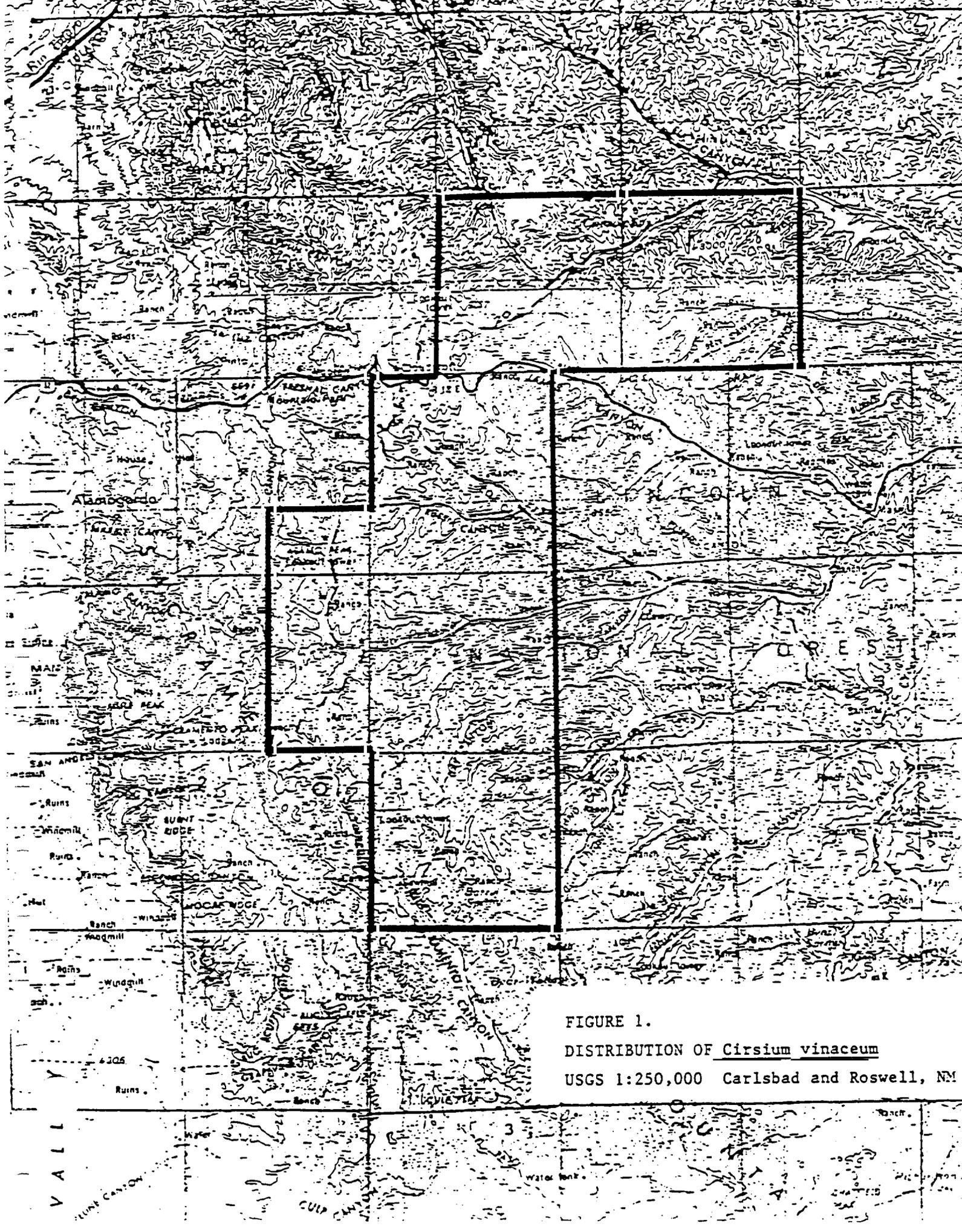


FIGURE 1.
DISTRIBUTION OF Cirsium vinaceum
USGS 1:250,000 Carlsbad and Roswell, NM

slopes, few other plant species, and little grass cover. In fact, spring habitats often support dense monospecific stands of Sacramento Mountains thistle. Occupied travertine soils have relatively high nitrogen and low phosphorus contents (Thomson and Huenneke 1990b). Relatively high sulfate concentrations in the water may also indicate groundwater contact with the gypsum deposits of the Yeso Formation (Hall 1964).

Population Biology

Many of the occupied Sacramento Mountains thistle habitat sites are scarcely more than 100 meters (330 feet) apart and are as small as 5 square meters (54 square feet). Therefore, they cannot be called "populations" in a reproductive or genetic sense of the term. At present, there is no clear understanding of what constitutes a population for this species. Pollen vectors include hummingbirds and numerous species of bees, beetles, flies, and moths. The seed is heavy, but fairly dispersible by wind. Therefore, gene flow from pollen vectors and seed dispersal is probably effective up to about 0.5 mile. If this were used as the minimum distance between populations, then approximately 20 populations occur throughout the current range (U.S. Fish and Wildlife Service 1988). Nevertheless, groups of plants that densely occupy wet travertine deposits are hereafter referred to as populations in the management sense of the term, since they occur on a unique and identifiable type of habitat.

Travertine substrates at springs and streams are the most densely occupied habitats. There are numerous examples of scattered plants that occur along streams and wet seeps downstream of and between the larger populations. The densities of these peripheral plants fluctuate greatly in response to yearly precipitation and grazing management practices. These scattered individuals may serve as stepping stones in the flow of genes between larger populations on more suitable habitats.

Some morphological and habitat variation between populations has been noted. For instance, at the Silver Springs site there is a large group of plants on calcareous soil in the valley bottom rather than on a travertine outcrop.

Impacts and Threats

The major threat to the Sacramento Mountains thistle is the potential appropriation and development of water rights directly from spring habitats. At present, the watershed is unadjudicated and the water rights at these springs are available to anyone wanting to appropriate water for a beneficial use. The Forest Service has some control through special use permits on how springs will be developed on the Lincoln National Forest. Water rights can be acquired without threat to Sacramento Mountains thistle spring habitats if the point of diversion is immediately below the spring. The Forest Service can stipulate this condition in a special use permit for spring development. At present, New Mexico is one of the few states that

does not have an instream-flow statute. Such a statute would allow appropriation of water rights to maintain minimum flows necessary to support biological values. Water for fish, wildlife, and other natural resources has not traditionally been considered a beneficial use under current management; however, it may be possible to establish this use of water in the future. Until instream-flow legislation is adopted by the State and water rights are appropriated for Sacramento Mountains thistle, this plant will always be threatened by spring development and loss of habitat.

Another land use that has been identified as a threat to this thistle is grazing. The Sacramento Mountains thistle occurs on four grazing allotments on the Lincoln National Forest. Grazing management over the past decade on the allotment with the majority of Sacramento Mountains thistle has required one complete growing season of rest for every summer of grazing use. However, during seasonal use, little effort in the past was made to distribute cattle grazing either by herding or constructing smaller pastures. The result has been severe grazing impacts to valley bottoms, riparian areas, and to individual plants where livestock were allowed to congregate for long periods. In recent years, permittees have made an effort to spend more time herding.

Some Sacramento Mountains thistle habitats, such as Silver Springs, which has been severely impacted from past trampling and soil compaction, have since been fenced. The Lucas Canyon populations illustrate a drastic reduction in plant rosette size as an apparent result of grazing impacts (Thomson and Huenneke 1990a). In Scott Able Canyon, cattle have been observed eating the flowering stalks of Sacramento Mountains thistle plants, and there were also signs of grazing on the leaves of the rosettes. Cattle have since been herded away from streamside thistles there. Aside from grazing causing damage to the overall vigor of the plant by reducing the number and size of leaves in the rosettes, damage to or loss of a flowering stem before seed set is very detrimental to the growth of thistle populations. Because these plants flower only once, the loss of a stem means the loss of the entire reproductive output of that plant (Laura Huenneke, Biology Department, New Mexico State University, Las Cruces, New Mexico, pers. comm. 1991).

Each Sacramento Mountains thistle population has its own level of vulnerability to grazing impacts because of the variable topographic position of occupied habitats. Fortunately, many of the spring habitats occur on large travertine bluffs too steep for frequent access by grazing livestock. Elk tracks have been observed in the thistle populations on some of these slopes, indicating that they are contributing to the herbivory as well.

Other types of potential land use impacts include logging and road building. The Forest Service has a policy of maintaining a 200-foot buffer area around known populations when trails, roads, and logging operations are planned (U.S. Forest Service 1989). Indirect impacts from timber harvests on groundwater, surface erosion, and sedimentation have not been

assessed. Little is known about the effects of logging on groundwater recharge areas that supply water to occupied habitats in the Sacramento Mountains of New Mexico.

Recreational impacts are occasionally observed in areas of high visitation, such as Bluff Springs. The Bluff Springs population has been closed to foot traffic by building a fence around the travertine bluff feature. The Forest Service has routed alternative foot trails around this population. Other thistle habitats are occasionally impacted by off-road vehicle traffic.

Many of the valley meadows within the range of the Sacramento Mountains thistle have recently become infested with the exotic teasel (Dipsacus sylvestris). Greenhouse competition studies of teasel and the Sacramento Mountains thistle indicate that the fitness of the native thistle is reduced when the stand is invaded by teasel. Results of germination trials suggest that thistle seeds are unable to germinate beneath a closed teasel canopy, but teasel may be able to germinate beneath dense thistle leaves (Thomson and Huenneke 1990c and 1990d). Therefore, there is potential for the thistle to become excluded from some of its drier habitats by the invasive teasel. At present, there is little evidence in the field that the saturated travertine of spring habitats is suitable for teasel invasion. However, there are some wet meadow habitats that do support both thistle and teasel. Therefore, the Service does not have a complete understanding of the ecological amplitude of teasel and its ability to occupy spring habitats.

Musk thistle (Carduus nutans), another exotic species that is similar in appearance to thistles, has been increasing in New Mexico and occurs in the Sacramento Mountains. Proposals to introduce biological controls for the musk thistle may pose a threat to similar native species like Sacramento Mountains thistle, and should not be implemented until possible effects on the Sacramento Mountains thistle have been determined.

Conservation Measures

Taking and Trade Prohibitions. The Act prohibits the malicious damage, destruction, or removal and reduction to possession of listed plants on areas of 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. The 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.

The Sacramento Mountains thistle is also a New Mexico State endangered plant species listed in NMNRD Rule 85-3 of the State Endangered Plant Species Act (9-10-10 NMSA). 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.

A permit is also required to collect plants from the Mescalero Indian Reservation and Lincoln National Forest.

Section 7 Requirements. Section 7 of the Act requires Federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species. Consultation with the Service may be informal (requests for list of species of concern, or discussion of effects of a proposed action) or formal (when a Federal agency such as the Forest Service or Bureau of Indian Affairs determines that a project may affect a listed species). Many informal consultations and one formal consultation have taken place between the Service and the Forest Service over the Sacramento Mountains thistle.

Conservation Planning and Management by the Forest Service. To mitigate grazing impacts, the Forest Service has constructed a total of 13 livestock exclosure fences around a total of 294 acres of thistle habitat (Table 1). Most of these exclosures are very small (less than 2 hectares or 5 acres) and cannot be treated as management units except for total exclusion of livestock.

Table 1. Habitat exclosures for Sacramento Mountains thistle on the Lincoln National Forest.

Exclosure	Acres
Hubbell	30.00
Mauldin	11.50
Lower Mauldin	4.30
Bluff Springs	121.50
Silver Springs	27.00
Lucas Spring	0.40
Water Canyon #1	0.04
#2	0.02
#3	0.01
#4	0.01
#5	0.03
#6	0.02
Upper Rio Penasco	<u>98.70</u>
Total	293.53

(Forest Service, unpublished data, 1991)

The populations in some of these fenced areas are being monitored by the Forest Service to determine what vegetation community changes result from a total grazing exclusion.

The Forest Service has developed and implemented a monitoring plan for populations of the Sacramento Mountains thistle. A monitoring plan for assessing the indirect effects of timber harvests and for determining characteristics of the watershed in Scott Able Canyon has been developed and implemented for the first year. A second, similar plan has been developed for populations of the thistle and the watershed in Lucas Canyon.

Research. Studies on competition and population biology of Sacramento Mountains thistle have been undertaken by faculty and graduate students from New Mexico State University, with the cooperation of Forest Service personnel.

PART II - RECOVERY

Objective and Criteria

The main objective of this recovery plan is to protect and manage the habitats necessary to sustain healthy populations of Sacramento Mountains thistle. The following actions are required to meet this objective and to allow the removal of the Sacramento Mountains thistle from the Federal list of threatened and endangered species.

1. Acquire water rights specifically for the maintenance of travertine spring habitats at a minimum of 30 percent of the occupied spring localities, including at least 1 occupied spring locality in each of the 20 known canyons of occurrence.
2. Develop habitat management plans to alleviate threats to the species and ensure permanent protection of at least 75 percent of the known occupied habitats according to steps outlined in the plans. Sites should include both core populations at springs as well as other occupied riparian habitats. Unoccupied stream habitat downstream of occupied springs should be protected for future colonization by the thistle.
3. Establish a 10-year monitoring and research program to demonstrate the effectiveness of management implemented under the plans.

There are 20 main canyon systems that have suitable habitat occupied by the Sacramento Mountains thistle. The largest and best representative spring habitat in each canyon system should have the water rights acquired for habitat maintenance by the land management agency. At present, there is no mechanism to acquire these rights without a developed point of diversion and stated beneficial use. Therefore, until the State of New Mexico adopts instream-flow or similar legislation, the Sacramento Mountains thistle must remain listed as threatened under the Act.

Recovery Outline

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

1. Protect existing populations of Sacramento Mountains thistle by removing threats to the species and managing its habitat
 11. Establish a spring habitat development policy on the Lincoln National Forest and the Mescalero Apache Reservation
 12. Monitor and encourage legislation for a state instream-flow statute and acquire water rights
 13. Enforce existing laws and regulations and consider development of new regulations
 14. Develop and implement a management plan to avoid detrimental land use impacts to known Sacramento Mountains thistle populations
 141. Livestock grazing management
 142. Timber harvest and road construction
 143. Regulate recreational activities
2. Monitor and study populations and natural habitat
 21. Locate all populations of Sacramento Mountains thistle
 22. Monitor population trends
 23. Begin experimental grazing treatments
 24. Develop a hydrologic model for occupied habitat
 25. Develop sediment delivery model for valley bottom habitats
 26. Monitor teasel plant encroachment on occupied habitats
 27. Biological controls
 28. Study the genetic relatedness within and between populations
3. Develop public awareness, appreciation, and support for preservation of the Sacramento Mountains thistle

Narrative Outline of Recovery Actions

1. Protect existing populations of Sacramento Mountains thistle by removing threats to the species and managing its habitat. The Sacramento Mountains thistle should be protected by controlling the development of water rights on spring habitats, enforcing existing laws, implementing a land management plan to control land use impacts to public land habitats, and monitoring to detect trends in population health.

11. Establish a spring habitat development policy on the Lincoln National Forest and the Mescalero Apache Reservation. The Forest Service and the Mescalero Apache Tribe should develop a clear, written policy that specifies point of diversion in special use permits issued for water development on springs that contain known populations of Sacramento Mountains thistle. This policy should prohibit point of diversion development within suitable habitat, but allow water collection immediately below occupied travertine substrate. The New Mexico State Engineer does not have the statutory authority to designate point of diversion on a water rights application and recognizes such a designation as a land management agency responsibility.

12. Monitor and encourage legislation for a state instream-flow statute and acquire water rights. If the State of New Mexico ever adopts instream-flow legislation, the Forest Service, as the land management agency responsible for most Sacramento Mountains thistle populations, should acquire the water rights to at least one occupied travertine spring habitat within each of the 20 known canyons of occurrence. The water right should encompass the total flow from the spring source to the point where the water leaves the travertine deposit.

13. Enforce existing laws and regulations and consider development of new 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 also encourage the Mescalero Apache Tribe to include protection of this species in the Tribal code. All Federal agencies should conduct required consultations with the Service under Section 7 of the Act.

14. Develop and implement a management plan to avoid detrimental land use impacts to known Sacramento Mountains thistle populations. The Forest Service has already developed a management plan for the Sacramento Mountains thistle on the Lincoln National Forest. Many of the following elements iterate this plan and are adequately addressed by the Forest Service, while some require modification. A similar management plan could also be adopted by the Mescalero Apache Tribe.

141. Livestock grazing management. National Forest populations are currently located in four grazing allotments: James, Sacramento, Scott Able, and Russia. The effect of grazing on the Sacramento Mountains thistle should be determined, and what, if any, grazing regimes are compatible with thistle management should be identified. Plants along streams should be afforded greater protection from the impact of frequent livestock grazing and trampling during grazing years or seasons. This will require dispersing livestock from riparian areas or creating small pastures to divert cattle from these areas when necessary. No livestock facilities or holding traps should be constructed on or near occupied habitat.
 142. Timber harvest and road construction. Present Forest Service policy to avoid known populations in timber harvest and road construction operations by using a 200-foot buffer area should be continued. Nothing is known, however, about the indirect hydrologic and erosional effects of these activities on the Sacramento Mountains thistle. Populations of Sacramento Mountains thistle in the vicinity of timber sale areas should be monitored during harvest. The effects of timber harvest or other large area disturbances on the groundwater recharge for occupied surface water habitats should be studied, and a hydrologic model developed as a management tool.
 143. Regulate recreational activities. Relocate trails to divert foot and off-road vehicle traffic around populations. Close unnecessary roads to protect habitat areas from vehicle use.
2. Monitor and study populations and natural habitat. A great deal of research has already been carried out on this species. However, additional searches, monitoring, and research on population genetics, exotic species competition, and the effects of land use impacts on habitats is still needed to prevent decline of this species.
 21. Locate all populations of Sacramento Mountains thistle. Conduct surveys of unexplored springs on the Mescalero Apache Reservation to determine the complete range of this species.
 22. Monitor population trends. Monitor all known populations on public land to determine if management plans are accomplishing the desired goals. In most cases, long-term monitoring can be accomplished with annual photographs from fixed photo points, in combination with recording the number of rosettes, flowering stalks, and life stage classification (including flowering, non-flowering, and juvenile stages).

23. Begin experimental grazing treatments. The effect of managed grazing should be assessed on valley bottoms that contain streamside and spring habitats. Grazing intensity and duration should be controlled by either herding operations or constructing a fence around manageable units of pasture. Grazing treatments should include periods of use when teasel is somewhat palatable. These treatments should be compared to adjacent populations that are completely excluded from livestock.
24. Develop a hydrologic model for occupied habitat. Develop a hydrologic model that identifies the groundwater recharge areas for occupied surface water habitats. Use this model to determine the effects of logging or other large area disturbance operations on the perennial flow of water in springs and streams.
25. Develop sediment delivery model for valley bottom habitats. The limits of total watershed disturbance (logging, grazing, and roads) should be determined on the basis of a model that describes erosion and/or sediment delivery to valley bottom populations of Sacramento Mountains thistle.
26. Monitor teasel plant encroachment on occupied habitats. Teasel encroachment on saturated travertine habitats has not occurred to any great extent at this time. This situation should be monitored, since teasel can compete with the Sacramento Mountains thistle if it can invade these travertine spring habitats.
27. Biological controls. Biological controls may also threaten the Sacramento Mountains thistle. Proposals to introduce biological controls for the exotic musk thistle may pose a threat to similar native species like Sacramento Mountains thistle, and should not be implemented until possible effects on the Sacramento Mountains thistle have been determined.
28. Study the genetic relatedness within and between populations. Genetic studies should be conducted to determine the extent of asexual reproduction within populations. Studies should also be conducted to determine relatedness between populations and the role of scattered streamside plants in genetic transfer between larger populations. These studies should include seed dispersal, pollen flow, and the movement of genetic material between populations.

3. Develop public awareness, appreciation, and support for preservation of the Sacramento Mountains thistle. Education of the public can be a vital part of the recovery of a species. The cooperation of the public is essential for the ultimate success of ongoing recovery measures. It is important to emphasize that not all species of thistles are pests or weeds. Public interest groups such as the Native Plant Society and The Nature Conservancy can lend physical and monetary support to recovery efforts and aid in management of habitat for the species.

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PART III - IMPLEMENTATION SCHEDULE

The following Implementation Schedule outlines actions and costs for the Sacramento Mountains thistle 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 recovery of the Sacramento Mountains thistle and protect its habitat. It should be noted that the estimated monetary needs for all parties involved in recovery are identified and therefore, Part III reflects the total estimated financial requirements for the recovery of this species.

Task Priorities

- Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.
- Priority 2 - An action that must be taken to prevent a significant decline in species population and habitat quality, or some significant negative impact short of extinction.
- Priority 3 - All other actions necessary to provide for the full recovery of the species.

Agency Abbreviations

- FWS - Fish and Wildlife Service
- ES - Ecological Services State Office
- LE - Law Enforcement
- FS - Forest Service
- NM - State of New Mexico
- MA - Mescalero Apache Indian Tribe
- USDA - United States Department of Agriculture

SACRAMENTO MOUNTAINS THISTLE RECOVERY PLAN IMPLEMENTATION SCHEDULE

PRIORITY #	TASK #	TASK DESCRIPTION	TASK DURATION (YRS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)			COMMENTS
				FWS		Other	YEAR 1	YEAR 2	YEAR 3	
				Region	Program					
1	11	Spring development policy	Ongoing			FS MA	5 5	2 2	2 2	
1	12	Acquire water rights	Ongoing	2	ES	FS NM	2 10 2	2 10 2	2 10 2	Needs State legislation
1	141	Livestock management	Ongoing			FS MA	20 10	10 5	10 5	
1	142	Logging practice impacts	Ongoing			FS MA	10 10	4 2	4 2	
1	22	Monitor population trends	10	2	ES	FS MA	10 10 5	10 10 5	10 10 5	
2	13	Enforce existing laws	Ongoing	2	LE ES	NM FS	8 16 16 16	8 16 16 16	8 16 16 16	
2	143	Regulate recreational activities	Ongoing			FS MA	10 2	4 2	4 2	
2	23	Grazing study	5			FS	10	10	10	
2	24	Hydrologic model	3	2	ES	FS	10 10	5 5	5 5	
2	25	Sedimentation model	2	2	ES	FS		5 10	5 20	
2	26	Teasel plant competition	5	2	ES	FS	10 5	10 5	10 5	
2	27	Biological controls	3			USDA	15	15	15	

SACRAMENTO MOUNTAINS THISTLE RECOVERY PLAN IMPLEMENTATION SCHEDULE continued										
PRIORITY #	TASK #	TASK DESCRIPTION	TASK DURATION (YRS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)			COMMENTS
				FWS		Other	YEAR 1	YEAR 2	YEAR 3	
				Region	Program					
3	21	Locate new populations	5	2	ES	FS	3 3	3 3	3 3	
3	28	Genetic study	3	2	ES		20	20	10	
3	3	Public support and awareness	Ongoing	2	ES	NM FS MA	1 1 1 <u>1</u> 257	1 1 1 <u>1</u> 221	1 1 1 <u>1</u> 221	

APPENDIX

Technical Reviewers

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

Renee Galeano-Popp, U.S. Forest Service (USFS), Albuquerque, New Mexico
Reggie Fletcher, USFS, Albuquerque, New Mexico
John Conner, USFS, Lincoln National Forest, Alamogordo, New Mexico
Sarah Wood, USFS, Lincoln National Forest, Mayhill, New Mexico
Norman Jojola, Mescalero Apache Tribe, Mescalero, New Mexico
Laura Huenneke, New Mexico State University, Las Cruces, New Mexico
Richard Spellenberg, New Mexico State University, Las Cruces, New Mexico
Jan Knight, Bureau of Land Management, Santa Fe, New Mexico
Gerry Hoddenbach, National Park Service, Santa Fe, New Mexico
Donna House, The Nature Conservancy, Santa Fe, New Mexico
Greg Fitch, New Mexico Forestry Division, Santa Fe, New Mexico
Sam Hitt, Forest Guardians, Santa Fe, New Mexico
Bruce Richardson, State Engineer's Office, Santa Fe, New Mexico
Ellen DeBruin, The Nature Conservancy, Albuquerque, New Mexico
Jean Dodd, Native Plant Society of New Mexico, Alamogordo, New Mexico
Melanie Florence, Native Plant Society of New Mexico, Las Cruces, New Mexico

Principal Comments Received on the Draft
Sacramento Mountains Thistle Recovery Plan and Service Responses

Availability of a Draft Recovery Plan for the Sacramento Mountains thistle for review and comment was published in the Federal Register (Vol. 57 No. 155) on August 11, 1992. The public comment period ended September 25, 1992. The comment period was extended upon request from the Forest Service until October 23, 1992.

There were twelve requests for copies of the Sacramento Mountains Thistle Draft Recovery Plan. Four letters were received: two from Federal agencies, one from a grazing association, and one from a professional botanist. Comments of a similar nature are grouped together. Substantive comments that questioned approach, methodology, or financial needs called for 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 Mountains thistle, were not included. Supportive comments 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 Mountains thistle at the New Mexico Ecological Services State Office.

Comment: Generally, the draft plan is well written and reasonable. It acknowledges the multiple-use philosophy of the Forest Service and includes provisions for managing the species and its habitat along with goals demonstrated to be compatible with recovery.

Service Response: The Service believes this species can be recovered through the implementation of management actions outlined in the recovery plan.

Comment: This document falsely states that the Sacramento Mountains thistle is threatened by improper livestock management.

Service Response: Over the past decade, both direct and indirect impacts of grazing have been observed by the Forest Service in the Sacramento Mountains thistle populations. Fencing and herding of livestock away from the thistle have occurred only in recent years. The effects of grazing on the thistle will continue to be monitored and evaluated by the Forest Service.

Comment: The document states that in one valley, the plants were severely impacted by livestock grazing. Except in riparian areas, the thistles are not found in valleys.

Service Response: Although travertine substrates at springs and streams are more densely occupied, the thistles have been documented in one valley. These plants are less palatable, spicier and tougher than other populations studied.

Comment: The plan falsely states that little effort was made to evenly distribute livestock grazing by herding or fencing, and thus, resulted in severe grazing impacts of valley bottoms.

Service Response: The Service recognizes that in recent years permittees have made an effort to reduce grazing impacts through herding. The Forest Service has also fenced several plots. These joint efforts have helped reduce impacts in riparian areas. This is noted in the final recovery plan.

Comment: There is concern that portions of the draft plan may be more specific than is needed. For instance, the Forest Service completed a formal consultation on grazing that explores the compatibility of various grazing systems with Cirsium vinaceum, and small pastures may not be optimal for the recovery of the species.

Service Response: If small pastures are not beneficial to the recovery of the Sacramento Mountains thistle, then a different approach should be used. This change has been incorporated into the final recovery plan.

Comment: The Sacramento Grazing Association has also monitored the thistle plants closely, and page four of this document states that monitored populations are somewhat stable. A close inspection of the plants show that they are more than "somewhat stable," they are thriving.

Service Response: It was determined that mortality and recruitment were "somewhat stable" in the monitored thistle populations. However, this is not true for all extant populations of the thistle.

Comment: According to this document, there are 293.53 acres exclosed. The Sacramento Grazing Association had a letter from the Forest Service stating there are 417 acres of exclosures for the thistle, with plans for only two additional exclosures in Lucas Canyon. However, listed in the recovery plan were exclosures in Hubbell, Mauldin, Lower Mauldin, and several more in Water Canyon.

Service Response: The number of acres with grazing exclosures is from information provided by the Forest Service.

Comment: Because of significant improvement in grazing management and habitat conditions, the Forest Service proposed the Service reconsider the Implementation Table, which places livestock management as a "Priority 1" task.

Service Response: Data on effects of grazing on the plants are conflicting. Some thistle populations have improved, while others declined in fenced and unfenced populations. The Forest Service should continue monitoring and evaluating grazing impacts on the thistle. Because the habitat of the species is critical to its recovery, and the thistle will not revegetate in heavily disturbed areas, the task remains "Priority 1."

Comment: The plan states that impacts from wildlife grazing and predation are less than those observed from livestock.

Service Response: Studies have been inconclusive. Therefore, it was not included in the final plan.

Comment: If plants must live in saturated lands, the potential threat from logging is preposterous. No logging ever occurs in riparian areas.

Service Response: Indirect effects from logging, such as road construction, siltation, alteration of hydrologic flows, increased surface water runoff, decreased infiltration, and higher sediment loads in streams, can occur.

Comment: The Forest Service asked for a reconsideration of the Implementation Table, which places "logging practice impacts" as a "Priority 1" task.

Service Response: More monitoring studies need to be done to determine impacts of logging on the thistle and its habitat before the Service will consider reducing this task priority number.

Comment: The recovery goals identified in the plan are defined in terms of a percentage of the total known populations rather than what is biologically needed to recover the species, suggesting that all populations are not needed for recovery, and raising questions about the threatened status of the species.

Service Response: The preservation and management of habitat are important to recovery of this species. Water rights must be acquired for the conservation of spring habitats for at least 30 percent of the occupied spring localities, including at least 1 occupied spring locality in each of the 20 canyons in which it occurs. Additional biological studies, including research on exotic species competition and biological controls, are also essential for recovery.

Comment: The Implementation Schedule includes cost estimates that do not accurately reflect what the Lincoln National Forest believes is needed to implement the tasks identified.

Service Response: We have incorporated cost estimates provided by the Lincoln National Forest in the final plan.

Comment: Is the policy of water diversion to be implemented for all suitable habitat whether it is occupied or unoccupied?

Service Response: Point of water diversion will be determined case-by-case based on the number of plants at the site, suitability of habitat, and total Sacramento Mountains thistle occupancy in the canyon. In the largest and best representative spring habitat in each canyon system, a point of diversion should be prohibited within suitable habitat.

The Forest Service, as the land management agency, should determine where the point of diversion would be least likely to affect the Sacramento Mountains thistle or its habitat.

Comment: If the point of diversion policy is an effective means of ensuring continued availability of spring habitat for the species, then why would water rights also need to be obtained?

Service Response: The unauthorized development of a spring near Bluff Springs resulted in a net loss of 84 percent (300 in 1984 to 47 in 1991) of one population and demonstrates the importance of acquiring water rights within spring habitat.

Comment: How can recreationalists impact the Sacramento Mountains thistle? This species is so thorny and dense that a person could not walk through it.

Service Response: Habitat and plants are destroyed in areas of concentrated human use. This can be done directly, for instance, by off-road vehicle traffic, or indirectly by diverting water from suitable habitat.

Comment: The Forest Service recommended the priority number assigned to recreation be changed from Priority 2 to a lower number.

Service Response: Running water attracts a large number of forest users, campers, and sightseers who directly and indirectly impact the thistle. Based on the current and best available information, recreation is a potential threat to the species, and therefore, the Service believes that regulation of recreational activities should remain a Priority 2 task.

Comment: Why does the Forest Service need to "close unnecessary roads?"

Service Response: Roads attract people and increase recreational use, including off-road vehicle traffic.