Interagency Rare Plant Team Inventory Results - 1998 through 2003.

DEBORAH J. CLARK[1] AND DAVID A. TAIT[2]

[1]Bureau of Land Management, 150 East 900 North, Richfield, UT 84701
[2]U.S. D. A. Forest Service, Fishlake National Forest, 115 East 900 North, Richfield, UT 84701

ABSTRACT. Fishlake National Forest, Dixie National Forest, Bureau of Land Management - Richfield Field Office, and Capitol Reef National Park became partners in an Interagency Agreement to inventory and monitor threatened, endangered, and sensitive plant species shared by these agencies. From 1998 to 2003, the Interagency Rare Plant Team surveyed and recorded over 650 new locations for 32 TES plant species, covering more than 70,000 acres of federally managed lands. Geographical Information System and Global Positioning System technologies were used to predict and map all known and newly discovered occurrences of rare plants in the study area. Sufficient population numbers and occurrence data were gathered during the course of this study to pursue delisting of one of the federally listed threatened species and has allowed the Utah Natural Heritage rarity status of seven sensitive species to be downgraded. Knowledge gained about these species and their habitat requirements has helped determine which species are truly rare and in need of additional conservation actions. In addition, results from this study help determine which species and populations should be monitored to find out if specific human activities are affecting them and will enable federal land managers to ensure that those plants are protected.

INTRODUCTION

The Bureau of Land Management Richland Field Office (BLM), U. S. D. A. Forest Service, Dixie National Forest (DNF) and Fishlake National Forest (FNF), and Capitol Reef National Park (CARE) share management responsibilities for many of the same Threatened, Endangered & Sensitive plant species (TE&S). To enable each of these agencies to better manage their shared TE&S species, they decided to create an interagency botany position and hire an employee to act as team leader for an interagency rare plant team. A BLM employee was hired for the team coordinator position and stationed at CARE. As funding allows, additional seasonal employees are hired to assist the interagency botanist with surveys and monitoring for shared TE&S species throughout their ranges, regardless of agency boundaries. Through the interagency agreement, agencies are able to pool funding so limited TE&S funding is more efficiently used to hire a multi-agency team.

The study area is located in south central Utah, in the Northern Colorado Plateau region. It extends from Hanksville (along Highway 24) west to Loa, north into the San Rafael Swell and south through the Waterpocket Fold and encompasses approximately 3,000 square miles. Unique geological conditions in combination with the arid climate and great elevation range within the study area have created

microhabitats that support over 40 rare and endemic plant species. The study area includes lands on DNF and FNF that are over 11,000 feet elevation and extends down through CARE onto BLM to approximately 4,000 feet elevation. Plant communities range from high mountain grasslands, spruce/fir forests, and aspen woodlands down through pinyon-juniper woodlands, sagebrush, shadscale grasslands, and sparsely vegetated badlands.

Eight federally listed and one candidate for federal listing species were selected as the primary focus for surveys; *Cycladenia humilis var. jonesii* (Jones cycladenia) (FWS 1986), *Erigeron maguirei* (Maguire's daisy) (FWS 1985b, FWS 1996), *Pediocactus despainii* (San Rafael cactus) (FWS 1987), *Pediocactus winkleri* (Winklers cactus) (FWS 1998), *Sclerocactus wrightiae* (Wright's fishhook cactus) (FWS 1979), *Spiranthes diluvialis* (Ute ladies-tresses) (FWS 1992b), *Townsendia aprica* (Last Chance townsendia) (FWS 1985a), *Schoencrambe barnebyi* (Barneby's reed-mustard) (FWS 1992a), and *Aliciella cespitosa,* formerly *Gilia caespitosa* (Rabbit Valley gilia) (FWS 1985c). Table 1 shows the distribution of each of the above species by agency.

An additional 30+ sensitive species occur within the study area. They are ranked as sensitive by the agencies and the Utah Natural Heritage Program (UNHP). The majority of species are ranked by UNHP as Global 1 or 2/State 1 or 2. This ranking is defined as (1) critically endangered throughout its range, with 5 or fewer occurrences known; and (2) endangered throughout its range, imperiled globally/statewide because of rarity with only 6 to 20 known occurrences.

The study area encompasses CARE, which has been a magnet for recreational activities for many years. The park itself is primarily an undeveloped area that receives almost three-quarters of a million visitors each year. Many of these visitors hike established trails or explore the backcountry. Lands adjacent to the park are managed by the U.S.D.A. Forest Service and BLM and offer hiking, camping, off-highway vehicle use, and horseback riding opportunities. Many of the areas that have high recreational use also have rare plant populations within or adjacent to them. Therefore, the whereabouts of rare plants in areas of high use and whether the plants are being affected by human activities is essential information for federal land managers. Four of the federally listed plant species occur in the northern portion of the park and on adjacent BLM lands and are in active cattle grazing allotments. For these four

Table 1. Federally protected plants by agency distribution

Species	Status	Agencies Found On			
		CARE	BLM	DNF	FNF
Cycladenia humilis var. jonesii	Threatened	X	X		
Erigeron maguirei	Threatened	X	X		X
Aliciella cespitosa	Candidate	X	X	X	X
Pediocactus despainii	Endangered	X	X		X
Pediocactus winkleri	Threatened	X	X		
Schoencrambe barnebyi	Endangered	X	X		
Sclerocactus wrightiae	Endangered	X	X		
Spiranthes diluvialis	Threatened	X	X		
Townsendia aprica	Threatened	X	X	X	X

species, it is essential for park and BLM management to know the whereabouts of these plants and whether cattle grazing may affect them.

METHODS

The primary purposes of this study are to (1) conduct intensive surveys for the target species on potential habitat within the study area, (2) determine potential for impacts by visitor, recreational or livestock use if possible, and (3) implement monitoring programs for species most likely to be affected by human impacts.

Prior to each field season, representatives of the participating agencies and the interagency botanist meet to discuss priorities for surveys and monitoring. A list of species and areas to be surveyed is selected for the upcoming field season. The list usually contains several of the target species plus a few sensitive species that an agency needs more information about. When an agency receives funding to conduct rare plant inventories adjacent to, but outside the primary study area they present this information at the annual meeting. These additional survey areas are discussed and if agreed upon by the group, then the team conducts surveys outside the primary study area. This cooperation and flexibility of the group has allowed the team to survey the Tushar Mountains on FNF, outside the primary study area for several endemic species. Findings from these additional surveys are included in this paper. Following this meeting, the interagency botanist compiles all available information and location data on the species selected for the season's fieldwork. This information is entered into Geographic Information System (GIS). It is then overlaid with geologic formations, slope, aspect, and elevation to create a profile of potential habitat by species. In addition to accurately depicting known and potential habitats, this analysis refines the range of the target species and helps resource managers plan how many people will be needed to accomplish the surveys. Depending on funding availability for the upcoming season, one or more seasonal employees are hired to assist the interagency botanist with surveys and monitoring.

After completing this initial work, the interagency rare plant team conducts surveys in potential habitat for the target species. Surveys begin in the early spring at lower elevations and as the season progresses the team moves to higher elevations, thus ensuring proper search times for each species. During the appropriate blooming time for each species, areas are surveyed by walking wandering transects through all accessible areas and/or by using binoculars to search cliffs. If an area contains potential habitat for two or more species and those species bloom at different times, then that area is searched multiple times to ensure surveys are as thorough as possible for each species. All areas surveyed are noted on topographical maps, regardless of whether the target or any sensitive species were found. This information is then entered into GIS so resource managers can quickly see if an area has been surveyed and whether TE&S plants were found.

For each new occurrence of a species, team members complete a modified version of the UNHP Site Visit Account Survey Form, take photographs, and map its location on 7.5' quadrangle maps. Wherever possible, a Global Positioning System (GPS) is used to

map the precise location of each new occurrence. All new localities are then entered into a master database and GIS that are shared by the participating agencies. This ensures long-term retrieval capabilities for current and future resource managers.

RESULTS

Surveys have been conducted since 1998 by the interagency botanist, a seasonal team leader hired by CARE, and numerous seasonal team members hired by each of the agencies. If additional people were needed to survey specific areas, CARE, BLM or Forest Service staff assisted on an as needed basis. Surveys typically begin in early April and continue into September. During the last six years, the interagency rare plant team has surveyed and recorded over 650 locations for 32 TE&S plant species. Twenty-three of the sensitive species known to occur in the study area were found and recorded (Table 2).

Because the target species are shared by the agencies and findings benefit the entire group, interagency cooperation in the form of funding, vehicles, and hiring employees from different agencies to all work on the same team has been significant. Additionally, since BLM, FNF and DNF administered lands generally occur at different elevation ranges and have a slightly different suite of sensitive species, this enables the team to efficiently survey on BLM and lower elevation areas in CARE early in the spring, then shift to the Forest Service and higher elevation areas in CARE later in the summer. Often surveys on CARE and BLM are completed by the end of June so if the Forest Service has priority species that occur outside the primary study area, i.e. Boulder Mountain on DNF for *Potentilla angelliae* and the Tushar Mountains on FNF for a suite of endemic species, the team is able to assist the Forest Service with these additional needs.

To date, the team has surveyed over 70,000 acres of federally managed lands. This includes approximately 29,000 acres on Capitol Reef National Park, 17,000 acres on Bureau of Land Management, 11,000 acres on Dixie National Forest and 13,000 acres on Fishlake National Forest. The effort has resulted in a dramatic increase in number of individual plants known for several species (Table 3).

Calendar years 2000, 2002 and 2003 were difficult periods to survey for plants since they were extremely dry years. Many of the plants targeted for surveys either didn't bloom or if they did bloom it was for a short time period. To compensate for this, the team moved to higher elevations sooner than originally planned and adjusted the list of species to look for those species that came up and bloomed despite the drought.

Habitat modeling information proved very useful in selecting potential habitat to survey. Approximately 90% of areas selected for surveys using elevation and geological formation contained sites with one or more of the target species. In addition to using geology and elevation range for selecting potential habitats, associate plant species lists for each sensitive species location were compiled. This information used in conjunction with geology and elevation assists field surveyors in targeting the best survey locations. Review of all past reports and findings show that aspect and slope were not as critical in the analysis for selecting potential habitat

TABLE 2. Threatened, Endangered and Sensitive plants recorded during this study. Rarity status rankings are those designated following 2002 survey results.

Scientific Name*	Common Name	Rarity/Legal Status
Aliciella cespitosa *(Gilia caespitosa)*	Rabbit Valley Gilia	**Candidate for listing** G2/S2
Aliciella tenuis *(Gilia tenuis)*	Mussentuchit Gilia	G1/S1
Astragalus consobrinus	Bicknell Milkvetch	G2G3/S2S3
Astragalus harrisonii	Harrison's Milkvetch	G2G3/S2S3
Astragalus laccoliticus	Caineville Milkvetch	G2?/S2?
Castilleja parvula var. parvula	Tushar paintbrush	G2/S2
Cirsium eatonii var. harrisonii	Eaton's thistle	G4G5T1Q/S1
Cycladenia humilis var. jonesii	Jones cycladenia	**Threatened** G3G4T2/S2
Cymopterus beckii	Pinnate spring-parsley	G1/S1
Draba sobolifera	Creeping draba	G2/S2
Erigeron abajoensis	Abajo daisy	G1G2/S1S2
Erigeron awapensis	Awapa daisy	G1Q/S1
Erigeron maguirei	Maguire's daisy	**Threatened** G2/S2
Eriogonum corymbosum var. revealianum	Reveal's buckwheat	G5T3/S3
Habenaria zothecina	Alcove bog-orchid	G2/S2
Hymenoxys acaulis var. nana	Cushion golden-flower	G5T1T2/S1S2
Lomatium junceum	Rush lomatium	G3/S3
Opuntia basilaris var. heilii	Heil's beavertail	G5T2T3/S2S3
Pediocactus despainii	San Rafael cactus	**Endangered** G2/S2
Pediocactus winkleri	Winklers cactus	**Threatened** G1/S1
Penstemon cespitosus var. suffruticosus	Tushar penstemon	G5T2/S2
Physaria acutifola var. purpurea	Ryberg's twinpod	G5T2/S2
Potentilla angilliae	Angel's cinquefoil	G1/S1
Salix arizonica	Arizona willow	G2G3/S2
Schoencrambe barnebyi	Barneby plains-mustard	**Endangered** G1/S1
Sclerocactus wrightiae	Wright's fishhook cactus	**Endangered** G2/S2
Senecio castoreus	Beaver Mountain groundsel	G1/S1
Sphaeralcea psoraloides	Psoralea globemallow	G2/S2
Spiranthes diluvialis	Ute's ladies-tresses	**Threatened** G2/S1
Thelesperma windhamii *(T. subnudum var. alpinum)*	Alpine greenthread	G2/S2
Townsendia aprica	Last Chance townsendia	**Threatened** G2/S2
Xylorhiza confertifolia	Henrieville woody-aster	G2G3/S2S3

*Scientific names generally follow Welsh (1993).

TABLE 3. Increase in Number of Plants Known

Scientific Name	Common Name	Number's Known Prior to 1998*	Number's Known by 2003*
Aliciella cespitosa (Gilia caespitosa)	Rabbit Valley Gilia	4,700	25,200
Aliciella tenuis (Gilia tenuis)	Mussentuchit gilia	1,000	10,600
Cymopterus beckii	Pinnate spring-parsley	2,000	32,000
Erigeron maguirei	Maguire's daisy	5,000	27,000
Hymenoxys acaulis var. nana	Cushion golden-flower	2,000	11,500
Pediocactus winkleri	Winklers cactus	5,000	6,500
Potentilla angelliae	Angel's cinquefoil	2,000	19,000
Schoencrambe barnebyi	Barneby's Reed-mustard	2,000	3,800
Thelesperma windhamii (T. subnudum var. alpinum)	Alpine greenthread	2,000	34,000
Townsendia aprica	Last Chance Townsendia	6,000	21,000

* all numbers are approximate

areas, with one exception. Slope and aspect were found to be essential for selecting potential habitat for *Schoencrambe barnebyi.* Initial surveys for this species focused in the Moenkopi formation with no regard for slope or aspect. After two years of surveying, Barneby's reed-mustard has only been found on steep, north-facing slopes in the Moenkopi formation.

Sufficient data was gathered during the course of this study to pursue delisting of *Erigeron maguirei,* a federally listed Threatened species. The interagency team is currently working with the U. S. Fish and Wildlife Service on a proposal to delist this species. Another significant result of this study is that the rarity status of six other species can be downgraded (Table 4). UNHP is responsible for maintaining the rarity status lists for Utah and is continually reviewing information submitted regarding status changes. Some of the species listed in Table 4 have already been downgraded, as noted in Table 2; others are still under review.

Results from this study have helped determine which of the target species should be monitored to find out if any human activities affect them. The team has initiated and is maintaining monitoring plots for *Pediocactus despainii, P. winkleri, Sclerocactus wrightiae, Townsendia aprica* and *Aliciella cespitosa.* These plots were established both for gathering life history information and determining if human activities or livestock grazing may affect these species.

Since agencies are required to spend time and money managing species that are federally listed or on sensitive species lists, it behooves them to know which species are truly rare and in need of protection. Findings from this study are helping the agencies refine their sensitive species list and focus their limited management dollars on the species most in need. Knowledge gained from this study is invaluable for resource managers making management decisions and ensuring that plants are protected. Another benefit of this agreement is that information gathered during this study enables the participating agencies to meet Congress' intent under the Endangered Species Act and to comply with federal management policies.

Table 4. Proposed status changes for seven TE&S species.

Scientific Name	Common Name	Rarity/Legal Status	Proposed Status Changes
Aliciella cespitosa	Rabbit Valley Gilia	**Candidate** - G1/S1	**Candidate** -G2/S2
Cymopterus beckii	Pinnate spring-parsley	G1/S1	G2G3/S2S3
Erigeron maguirei	Maguire's daisy	**Threatened** -G2/S2	G2G3/S2S3
Hymenoxys acaulis var. *nana*	Cushion golden-flower	G5T1/S1	G5T3/S3
Lomatium junceum	Rush lomatium	G2/S2	G3/S3
Pediocactus winkleri	Winklers cactus	**Threatened** - G1/S1	**Threatened** -G2/S2
Thelesperma windhamii (T. subnudum var. alpinum)	Alpine greenthread	G5T1/S1	G5T2/S2

LITERATURE CITED

U.S. Fish and Wildlife Service. 1979. Endangered and Threatened Wildlife and Plants; Ruling to list *Sclerocactus wrightiae* as Endangered under the authority of the Endangered Species Act. October 11 1979. Federal Register. 44 FR 58866-58868

_____ 1985a. Endangered and Threatened Wildlife and Plants; Ruling to list *Townsendia aprica* as Threatened under the authority of the Endangered Species Act. August 21, 1985. Federal Register. 50 FR 33734-33737

_____ 1985b. Endangered and Threatened Wildlife and Plants; Ruling to list *Erigeron maguirei* as Endangered under the authority of the Endangered Species Act. September 5, 1985. Federal Register. 50 FR 36089-36092

_____ 1985c. Endangered and threatened wildlife and plants; review of plant taxa for listing as endangered or threatened species. 27 Sept. 1985. Federal Register 50(188):39526-39584

_____ 1986. Endangered and Threatened Wildlife and Plants; Ruling to list *Cycladenia humilis var. jonesii* as Threatened under the authority of the Endangered Species Act. June 4, 1986. Federal Register. 51 FR 86 16526

_____ 1987. Endangered and Threatened Wildlife and Plants; Ruling to list *Pediocactus despainii* as Endangered under the authority of the Endangered Species Act. September 16, 1987. Federal Register. 52 FR 34914-34917

_____ 1992a. Endangered and Threatened Wildlife and Plants; Ruling to list *Schoencrambe barnebyi* as Endangered under the authority of the Endangered Species Act. January 14, 1992. Federal Register. 57 FR 1398-1403

_____ 1992b. Endangered and Threatened Wildlife and Plants; Ruling to list *Spiranthes diluvialis* as Threatened under the authority of the Endangered Species Act. January 17, 1992. Federal Register. 57 FR 2048-2054

_____ 1996. Endangered and Threatened Wildlife and Plants; Ruling to reclassify and down list *Erigeron maguirei* as Threatened under the authority of the Endangered Species Act. June 19, 1996. Federal Register. 61 FR 31054-31058

_____1998. Endangered and Threatened Wildlife and Plants; Ruling to list *Pediocactus winkleri* as Threatened under the authority of the Endangered Species Act. August 20, 1998. Federal Register. 52 FR 34914- 34917

Welsh, S. L. et al. 1993. A Utah Flora, second edition, revised. Brigham Young University Press, Provo, Utah. 986 pp.

.