

Central Utah Navajo Sandstone Endemics Conservation Agreement

for

Aliciella cespitosa
(Rabbit Valley gilia or Wonderland alice-flower)

Aliciella tenuis
(Mussentuchit gilia)

Astragalus harrisonii
(Harrison's milkvetch)

Cymopterus beckii
(Pinnate spring-parsley)

Erigeron maguirei
(Maguire's daisy)

U.S.D.A. Forest Service, Fishlake National Forest
U.S.D.O.I. Bureau of Land Management, Utah State Office
U.S.D.O.I. National Park Service, Capitol Reef National Park
U.S.D.O.I. Fish and Wildlife Service, Utah Field Office

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Conservation Agreement

I. INTRODUCTION

This document contains both an interagency Conservation Agreement (Agreement) and an interagency Conservation Strategy (Strategy). The primary purpose of these documents is to identify and meet the goals for long-term conservation of five rare endemic plants that occur on the Navajo Sandstone in central Utah, referred to as the Navajo endemics. This will be accomplished through proactive management of the species and the ecosystems upon which they depend. The conservation of these species will require a reduction of threats, maintaining existing populations, and expanding our knowledge about their distribution and life histories. These efforts will also benefit other species whose ranges overlap the habitat occupied by the Navajo endemics.

A second purpose of this Conservation Agreement is to establish a process for cooperation among the Bureau of Land Management (BLM), U.S. Forest Service (USFS), National Park Service (NPS), and U.S. Fish and Wildlife Service (USFWS) in the exercise of their responsibilities under the Endangered Species Act (ESA) of 1973, as amended (ESA, 16 U.S. C. 1531 *et seq.*). This Agreement will also meet the needs of the 1994 Memorandum of Understanding on the conservation of species that are trending towards federal listing (94-SMU-058), which the above agencies signed. It will remain in effect until superseded by a new, revised or amended plan of action and will be incorporated into each agency's resource management plans as applicable.

Since long-term maintenance of these species is the ultimate objective of the involved federal agencies, the goal of this Agreement is to identify a course of action for the agencies that will contribute to the species long-term management and conservation. This Agreement is designed to complement ongoing conservation actions and to formalize a program of conservation measures to address identified threats to the species and the ecosystems upon which they depend. It will also expand current knowledge on abundance and distribution of the species and their life history requirements.

The Strategy outlines active management actions that will occur over the ten-year period from 2007 to 2017. These conservation actions and management activities will be reviewed annually for success of implementation and protection of the Navajo endemics. It also provides the protection framework and identifies monitoring strategy requirements necessary for future delisting of *Erigeron maguirei*.

This Conservation Agreement presents the existing data available for the five Navajo endemic plants. The Navajo endemic suite of plant species as treated in this document, is comprised of *Aliciella cespitosa* (Rabbit Valley gilia), *Aliciella tenuis* (Mussentuchit gilia), *Astragalus harrisonii* (Harrison's milkvetch), *Cymopterus beckii* (Pinnate spring-parsley), and *Erigeron maguirei* (Maguire's daisy). The biology of these species, including description, distribution, and habitat are discussed within the current environmental setting. Land uses and impacts from past and current threats are evaluated. Current protection mechanisms available to the Navajo endemics are also evaluated.

The Navajo Sandstone geologic formation where these species occur was deposited approximately 190 to 136 million years ago during the Jurassic period. At that time, this portion of western North America was an expansive desert with sand dunes reaching up to 2,200 feet thick. As subsequent geologic layers were deposited on top of the sand dunes, heat, pressure, and water cemented the sand grains together. The overlying deposits eventually wore away and exposed today's sandstone.

Little information is available on the historic abundance of the Navajo endemics because their distributions are still being identified. Although our current understanding of the ecology, biology, and management needs of the Navajo endemics is just beginning, this document uses all the available data and provides the initial direction for conservation until more information is available. It also describes and prioritizes the life history information needed for each species.

Final approval of this interagency Conservation Agreement represents a commitment by the involved federal agencies to manage these sensitive plant resources in a manner consistent with each agency's policies, as described in; Forest Service Manual Chapter 2670, Bureau of Land Management Manual 6840, NPS Management Policies, the ESA and Interagency Cooperation Regulation 50 CFR 402. These policies help insure that species do not become threatened or endangered as a result of federal agency activities.

II. INTERAGENCY PARTNERSHIP

This suite of species is currently being managed by a group of federal agencies that are partners in an Interagency Rare Plant Agreement (2002). This Interagency Rare Plant Agreement was established in 1999 between BLM (Richfield Field Office), Capitol Reef National Park (CARE), and the Dixie (DNF) and Fishlake National Forests (FNF). It enables the agencies to work together in implementing active management programs to identify and promote the conservation of all federally listed or candidate species and their critical habitats, and all sensitive species and their habitats within agency boundaries. Since there are numerous threatened, endangered, and sensitive (T E & S) species whose distributions overlap agency jurisdictions, it is to the mutual scientific benefit and operational efficiency of the agencies to manage these T E & S species cooperatively on an ecosystem basis. Beginning in 1999, the agencies hired an Interagency Botanist to oversee a team of seasonal employees, thus creating an Interagency Rare Plant Team. This team conducts inventories for species, including the Navajo endemic suite of rare plants, throughout the jurisdiction of all these agencies. The area encompassed by this Interagency Rare Plant Agreement is the same area administered by the Interagency Rare Plant Agreement. Beginning in 2005, lands within the area of this Conservation Agreement and Strategy on DNF are administered by the FNF.

III. SPECIES INVOLVED AND THEIR LEGAL STATUS

A. *Aliciella cespitosa* (*Gilia caespitosa*)



Aliciella cespitosa is a naturally rare species that has been documented in Federal Register notices as rare since the 1975 Smithsonian Institution Report to Congress under the name *Gilia caespitosa*. On June 16, 1976, the FWS published a proposed rule (41 FR 24524) to make a determination that approximately 1,700 U.S. vascular plant species recommended by the Smithsonian report be listed as endangered species pursuant to Section 4 of the Act. In 1980, the status of *Aliciella cespitosa* was categorized as Category 1 Candidate (C1) (45 FR 82480).

Aliciella cespitosa was one of the species addressed in the lawsuit, Fund for Animals *et al.* v. Manuel Lujan, *et al* (U.S. District Court 1992). On December 15, 1992, a settlement agreement was signed in this case in which "by no later than September 30, 1996, defendants agree to propose for listing all species that were officially categorized as C-1 as of September 1, 1992 or make a finding that the species no longer warrants listing published in the Federal Register." Successful implementation of conservation measures in the *Gilia caespitosa* Conservation Agreement and Strategy (1996) satisfied the requirements with regard to the lawsuit settlement agreement without the need to officially list the species under the Endangered Species Act (ESA). Most of the management actions identified in the 1996 strategy have been accomplished and the agencies need to identify the next steps necessary to continue protection for this species. Significant new sites were found between 2000 and 2003, and this information will be incorporated into the Central Utah Navajo Sandstone Endemics Conservation Agreement. The finalization of the Central Utah Navajo Sandstone Endemics Conservation Agreement will supercede the 1996 *Gilia caespitosa* Conservation Agreement and Strategy. Any action items that were not completed will be included in the action items of the Central Utah Navajo Endemics Conservation Agreement.

B. *Aliciella tenuis* (*Gilia tenuis*)

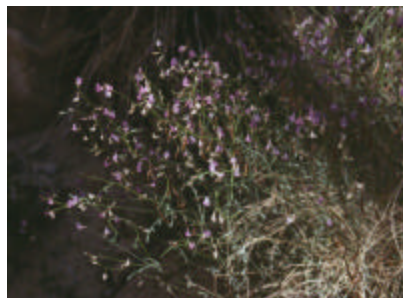
Aliciella tenuis was described as a species in 1989 and has been considered to be naturally rare for many years. By 1991, the BLM Richfield and Price Field Offices recognized *Aliciella tenuis* on their sensitive species lists (Atwood *et al.* 1991). This species was found in CARE in 1995 and added to their sensitive species list at that



time. These federal agencies have conducted extensive inventory surveys throughout the presumed range of *Aliciella tenuis* since 2001. On May 19, 2003, the Southern Utah Wilderness Alliance, Center for Native Ecosystems, and Utah Native Plant Society petitioned the FWS to list Mussentuchit gilia as threatened or endangered under the ESA. When FWS did not respond to the initial petition, the same groups noted above submitted a second petition to list *Aliciella tenuis* on March 9, 2004. FWS addressed this petition in their January 26, 2006 Federal Register notice. Their finding was that the petition did not provide substantial information indicating that listing *Gilia*[=*Aliciella*] *tenuis* was warranted.

Implementation of the measures in this conservation agreement and strategy will aid in the conservation of *Aliciella tenuis* and its habitat.

C. *Astragalus harrisonii*



As with Rabbit Valley gilia, *Astragalus harrisonii* is a naturally rare species that has been documented in Federal Register notices as rare since the 1975 Smithsonian Institution Report to Congress. In 1976, it was also proposed as endangered on the FWS mass listing proposal but was withdrawn in 1979. Although it has been mistakenly reported from nearby areas, this species is only known to occur in CARE where it has always been treated as a sensitive species. Implementation of this Agreement will help ensure that this rare endemic is protected.

D. *Cymopterus beckii*

Cymopterus beckii was known to be naturally rare for many years but has not been included in any listing documents or reviews. As with the previous species, federal land management agencies in this area have had this plant on their sensitive species lists



since the early 1990's. More recent intensive surveys have increased known numbers and the known species range. Implementation of this Agreement will help ensure this uncommon endemic continues to be protected.

E. *Erigeron maguirei*



Erigeron maguirei is an endemic species that was also included in the 1975 Smithsonian Institution Report to Congress warranting listing. The 1978 amendments to the Act required that all proposals over two years old be withdrawn. The withdrawal notice included *Erigeron maguirei*. A revised notice of review for plants published on December 15, 1980 (45FR 82480) again included *Erigeron maguirei* as a candidate for federal listing. Finally, on September 5, 1985 FWS published the final rule that listed *Erigeron maguirei* var. *maguirei* as endangered under the Endangered Species Act. On September 27, 1985, the FWS published a notice of review (50 FR 39526) that included *Erigeron maguirei* var. *harrisonii* as a candidate species. This variety of *Erigeron maguirei* remained a candidate through September 1993. *Erigeron maguirei* var. *harrisonii* was described by Welsh (1983a) from a specimen he collected in 1982 near Fruita, Wayne County, Utah. Following this publication, he suggested that the morphological differences between *Erigeron maguirei* var. *maguirei* collected from the San Rafael Swell and *Erigeron maguirei* var. *harrisonii* collected from Capitol Reef were ecotypic variations (Welsh 1983a, 1983b, Welsh et. al. 2003). Both varieties were collected by Heil (1993) in CARE, where in he hypothesized that *Erigeron maguirei* var. *harrisonii* was an ecotypic shade variant of *Erigeron maguirei* var. *maguirei*.

In 1992, the FWS funded genetic studies to determine the validity of these two varieties to clarify their legal status. Van Buren (2002) collected these two varieties of *Erigeron* and several other *Erigeron* species for genetic analysis to help determine the phylogenetic relationship of these varieties. She determined through DNA analysis that the two varieties were not distinct and that recognition of varietal levels for *Erigeron*

maguirei was not warranted. Since the variety *harrisonii* was no longer recognized, it was removed from the candidate species list. On September 7, 1994 (59 FR 46219), FWS published a notice proposing to change the entry for *Erigeron maguirei* var. *maguirei* to *Erigeron maguirei*, with the understanding that this would include the plant formerly recognized as variety *harrisonii*. This notice also proposed to reclassify the species from endangered to threatened as defined by the ESA.

Field surveys were conducted by BLM, FNF, and CARE from 1997 through 2002. These efforts refined the range in CARE, extended it onto FNF, and greatly increased the number of plants known to exist (Clark 1998, 2001, 2002, 2005). Van Buren monitored plots of *Erigeron maguirei* from 1992 through 2001 and found that trends in mortality percentages tend to be stable from year to year (Van Buren 2002). These along with other findings and management actions have met the criteria described in the Maguire's Daisy Recovery Plan (FWS 1995) established for delisting the species. This Agreement will outline additional management actions and monitoring necessary to ensure the continued protection of this species.

IV. SPECIES NOMECLATURE AND DESCRIPTIONS

A. *Aliciella cespitosa* (A. Gray) J.M. Porter

Lester F. Ward first collected *Aliciella cespitosa* in 1875 near Teasdale, Utah. The specimen was identified by Asa Gray (1876) as a member of the genus *Gilia* and described the following year. The recognition of this species as a rare member of the Polemoniaceae family was brought forward in 1975 by James Reveal who compiled a list of rare species for Utah for the Smithsonian Institute report to congress in accordance with Section 12 requirements of the ESA. Further discussion of the nomenclature of *Aliciella cespitosa* is available in a status report for *Gilia caespitosa* prepared by J. Mark Porter and Kenneth D. Heil (1994). This species, along with other members of *Gilia* section *Giliandra*, was transferred to the genus *Aliciella* Brand (Porter 1998). A change in common name from Rabbit Valley *gilia* to Wonderland Alice Flower was also proposed in the *Gilia caespitosa* Conservation Agreement and Strategy (1996). The original common name comes from the initial collection record and the nearby valley, which is outside the species distribution. The proposed common name comes from the new genus combined with Wayne Wonderland, an old name for the area actually occupied by *Aliciella cespitosa*.

Flowering plants have 1 to 20 or more stems above the ground and a woody caudex below the soil surface. Plants are (1) 3-11 (30) cm tall with stems forming a tufted dome with a small cluster of leaves at the base. The leaves in the basal cluster are 3-20 mm long, 1-3 mm wide and always covered with sticky hairs (often sand adheres to the leaves). Above the cluster of leaves, along the stem, the leaves are much smaller. The stems have lateral branches starting about mid-way up the stem, but sometimes the lateral branches may start within the basal leaf cluster. All of the stems are covered with same kind of sticky hairs as the leaves. Stems typically end with a small cluster of 1 to 5 (7) flowers. The flowers consist of five sepals as well as 5 petals both fused and forming a narrow tube; the petals are 4.0-5.7 mm long. Flower color varies from scarlet to vermilion, crimson, or pink. The flowers have 5 anthers that

are attached at the same level. Fruit is a capsule, 3.0-5.5 mm long with (3) 5-11 seeds per locule (Porter and Heil 1994).

B. *Aliciella tenuis* (F. Smith & Neese) J.M. Porter

Aliciella tenuis was first collected in 1932 by Walter P. Cottam in the San Rafael Swell. The specimen was identified only as *Gilia*. The Cottam collection was examined several times during the 1950's and 1960's by Verne Grant and Alva Day. Their annotations suggest that this species was recognized as being unusual and probably related to either *G. subnuda* A. Gray or *G. leptomeria* A. Gray. This species was not collected again until 1980 when Duane Atwood and Bob Thompson found it near Last Chance Creek (Smith and Neese 1989). They also suggested that it was close to *G. subnuda*. During a threatened and endangered plant survey of the BLM Richfield District in the 1980's, this species was again collected along Mussentuchit Creek (a tributary of Last Chance Creek) by Frank Smith. Within three years of Smith's Mussentuchit Creek collections, additional collections were made both near Last Chance Creek and near Muddy Wash at the west base of the San Rafael Swell. As a result in 1989, *Aliciella tenuis* was described as a new species, *Gilia tenuis* (Smith and Neese), with the common name Mussentuchit gilia. Based on morphology, Porter (1993) substantiates that there is no question that *Aliciella tenuis* is amply distinct from other members of the *G. subnuda* lineage (*G. subnuda* A. Gray, *Aliciella caespitosa* A. Gray, *G. haydenii* A. Gray and *G. formosa* Greene ex Brand), and on-going genetics work continues to support that *Aliciella tenuis* is a distinct species (Lee Johnson, pers. comm. 2005). In 1998, Porter completed his work recircumscribing *Gilia tenuis* to *Alicella tenuis* in the Polemoniaceae family (Porter 1998).

Mussentuchit gilia ranges from 0.5 to 3 dm tall. The caudex is usually branched and covered with brown marcescent leaf bases. Herbage is stipitate glandular that usually is covered with grains of sand. Basal leaves are 0.4 to 5 (8) cm long, 1 to 9 mm wide, spatulate to narrowly oblanceolate or obovate, and they may be merely toothed or pinnately lobed to entire, with tiny pointed spines. There are few cauline leaves much reduced in size. Inflorescence is paniculately cymose. Flowers are usually solitary growing from the branch ends. Calyx is 4 to 6 mm long, with triangular lobes shorter than the tube. Tube is 9 to 13 mm long, colored pale blue. Stamens are equally inserted. It usually blooms in May and June (Porter and Heil 1994).

C. *Astragalus harrisonii* Barneby

Astragalus harrisonii was first discovered near Fruita by Rubert C. Barneby in 1961. He described it in 1964 (Barneby 1964) and named it for Brigham Young University professor Bertrand E. Harrison. In Capitol Reef, this species is sympatric with *Astragalus coltonii*, which has a similar appearance but has morphological characteristics that easily separate the two. In some locations, plants have been found that contain the morphological characteristics of both species and are apparently hybrids. Genetics work is needed to clarify the relationships between these species and the status of the apparent hybrids.

Harrison's milkvetch is in the pea family (Fabaceae) and is a rushlike, caulescent perennial that grows 40-70 cm tall. Stems are diffusely interbranched and form clumps to 1 m wide or more. The pubescence is basifixed. Stipules are 1-5 mm long and

distinct. Leaves are 1.5-6.5 cm long, the uppermost simple, with the terminal leaflet expanded and confluent with the rachis. The other leaves have 3 to 9 leaflets, 2-11 mm long, 0.5-1.5 mm wide, linear-elliptic, acute and strigose on both sides. Peduncles are 6-19 cm long. Racemes are loose, 3 to 15 flowered, with the flowers ascending at anthesis. The axis is 5-40 cm long in fruit, with bracts 0.5-1.1 mm long. Pedicels are 1.5-5.5 mm long, campanulate, strigose, with teeth 0.5-1.9 mm long and triangular. Flowers are 9-10.5 mm long and pink purple in color. The pods are pendulous, stipitate, with a narrowly ellipsoid body that is either straight or curved and 17-28 mm long. It is dorsiventrally compressed, strigose to glabrous and unilocular. There are 10 to 12 ovules. The stipe is 3-4 mm long. (Welsh 2003).

D. *Cymopterus beckii* Welsh and Goodrich

Cymopterus beckii was originally collected by D. E. Beck at Fruita (in CARE) in 1938. Stanley Welsh and Sherel Goodrich described the species in 1981.

Pinnate spring-parsley is a member of the carrot family (Apiaceae). It extends from a taproot with a simple or sparingly branched crown, which often has marcescent leaf bases. Pinnate spring-parsley is a bright green herbaceous perennial that reaches 4 dm in height. Leaves extend up the stems from a base covered with marcescent leaf bases. Petioles are 2 to 13 cm long and leaf blades are 2 to 10 cm; leaves one to two pinnately compound with 2–3 pairs of lateral leaflets. The 3 to 7 leaflets are linear to linear-elliptic, 0.5 to 4 cm long (terminal leaflet may be slightly longer to 5.5 cm) and 1 to 2 mm wide. The leaves give it a feathery looking appearance. Peduncle is usually 4 to 8 (19) cm tall. Flowers are a yellow umbel, with 1 to 3 per stem. Fruit is about 6 to 8 mm long, with lateral wings to 1 mm wide with the dorsal ones narrower. Pinnate spring-parsley can be distinguished from the closely related *Cymopterus lemmonii* by *Cymopterus beckii* having entire leaflets, glabrous peduncles and rays, and slightly longer fruit (Welsh 2003).

E. *Erigeron maguirei* Cronquist

Erigeron maguirei was collected as an unidentified species in 1940 by Bassett Maguire in the San Rafael Swell, Utah. This specimen was described by Arthur Cronquist in 1947 as *Erigeron maguirei*. Welsh (1983a) described *Erigeron maguirei* var. *harrisonii* from a specimen collected in 1982 near Fruita, Wayne County, Utah. A specimen of this variety was also collected near Hickman Bridge in Wayne County, Utah in 1936. It was suggested that the morphological differences between *Erigeron maguirei* var. *maguirei* collected from the San Rafael Swell and *Erigeron maguirei* var. *harrisonii* collected from Capitol Reef were ecotypic variations (Welsh 1983a, 1983b, Welsh et. al. 2003). Both varieties were collected by Heil (1993) in CARE. Heil (1993) hypothesized that *Erigeron maguirei* var. *harrisonii* was an ecotypic shade variant of *Erigeron maguirei* var. *maguirei*.

In 1992, the FWS funded genetic studies to determine the relationship of these two varieties. Renee Van Buren (1992, 1993) initiated monitoring plots for *Erigeron maguirei* and collected several specimens of the two varieties in the San Rafael Swell and CARE. She also collected several other *Erigeron* species for genetic analysis to help determine the phylogenetic relationship of these varieties. Renee Van Buren determined through DNA analysis that the two varieties were not distinct and that

recognition of varietal levels for *Erigeron maguirei* was not warranted. In Volume 5 of the Intermountain Flora, Cronquist (1994) synonymized *Erigeron maguirei* var. *harrisonii* into *Erigeron maguirei*. Van Buren continued to monitor plots of *Erigeron maguirei* from 1992 through 2001 (Van Buren 2002).

Field surveys conducted by BLM, FNF, and CARE from 1997 through 2002 refined the range in CARE and extended it onto FNF (Clark 1998, 2001, 2002).

Maguire's daisy, a member of the sunflower family (Asteraceae), is an herbaceous perennial which results from a branched caudex. Caudex branches have brown to straw colored marcescent leaf bases while herbage is spreading hirsute. The stems are 7-28 cm long. The basal leaves are 2-5 cm long, 3-8mm wide, and oblanceolate to spatulate in shape with a round apex. Cauline leaves are well developed, but somewhat reduced upward. Flowers are solitary or in clusters of 2-5, bracts are imbricate and green or yellowish. The inner bracts are often less pubescent, with scarious purple tips. The ray flowers are white or pinkish and 12-20 per head. It can be distinguished from other members of the *Erigeron* genus by its more numerous heads per stem, its narrower ray corollas, and shorter disk corollas. Another distinguishing characteristic is the presence of highly pubescent herbage (Welsh 2003).

V. SPECIES HABITAT AND ECOLOGY

A. *Aliciella cespitosa*

Aliciella cespitosa occurs in drainages of eroded or detrital Navajo and Wingate sandstones associated with cliffs, ledges and exposed outcrops. The habitat is associated with recurring, if not constant, water and wind erosion. Erosion may be largely responsible for the presence of this type of habitat, often marked by cracks in sandstone packed by eolian sand and detritus/eolian deposits (Porter and Heil 1994). Plants occur in full sun or in shaded canyons, on exposed sandstones and cliff walls, to less commonly in small sandy areas. They occur at any aspect between 5100 and 9000 feet elevation.

Aliciella cespitosa is found in association with open pinyon-juniper woodlands that are often mixed with some elements of mountain brush, sagebrush steppe, or ponderosa pine forest. Frequently associated species include pinyon pine (*Pinus edulis*), ponderosa pine (*Pinus ponderosa*), Utah juniper (*Juniperus osteosperma*), little-leaf mountain mahogany (*Cercocarpus intricatus*), Alderleaf mountain mahogany (*Cercocarpus montanus*), Bigelow's sagebrush (*Artemisia bigelovii*), Utah serviceberry (*Amelanchier utahensis*), round-leaf buffaloberry (*Shepherdia rotundifolia*), shadscale (*Atriplex confertifolia*), Mormon tea (*Ephedra torreyana*), rough mules-ears (*Wyethia scabra*), Harriman's yucca (*Yucca harrimaniae*), Cushion golden-flower (*Hymenoxis acaulis*), Indian ricegrass (*Stipa hymenoides*), and Salina wildrye (*Elymus salinus*).

Preliminary data suggests this species is a self-incompatible and an obligate out-crossing species (Porter and Heil 1994). Alston and Tepedino (2005) began a three-year project with the NPS at CARE to study pollinators of several of the endemic plant species occurring in the park. Their study found that *Aliciella cespitosa* flowers do not set fruit or produce seeds unless they receive pollen from another flower and that the pollinators are most likely two species of hummingbirds and several species of native

bees. Maturation of the anthers of *Aliciella cespitosa* first appears imminent when flower buds turn orange. Over the next 48 hours flowers develop through an orange-red stage into a full red bud stage as petals begin to lengthen. During the next day petals become fully extended and open. At this time, flowers are producing pollen but the stigmas are not yet receptive and therefore it is highly unlikely that automatic, within flower, self-pollination can occur. Anthers dehisce completely over the next 48 hours and the style extends towards the corolla opening, but the stigma still remains closed. Flowers then enter a relatively short female phase as the stigma lobes open and become receptive for about 12 to 24 hours. Flowers then wilt and dehisce if unpollinated (Alston and Tepedino 2005).

Phenological patterns vary slightly from year to year due to variable weather patterns. Flowering generally begins in early to mid June and continues through July, and occasionally to mid-August. Fruiting closely tracks flowering and begins in late June.

Aliciella cespitosa is a long-lived perennial species that over-winters as a series of rather loose basal rosettes of leaves. After vernalization, the primary axes elongate and flowering begins. A few of the axial buds of the lower leaves of the rosette develop into the new basal rosettes of leaves, which must again over-winter. This annual ramification might be interpreted as a type of “vegetative reproduction”. However, because the same taproot is maintained year after year and adventitious roots are not produced, in a strict sense this is not true clonal reproduction (Porter 1993). Flowering plants are at the smallest 2cm x 2cm, and are presumed several years old. Monitoring to date has documented that plants up to 3 years in age have not flowered and seem to be several years from the potential of flowering (C. Dawson, pers. comm.)

Carol Dawson (1998) reported very low recruitment of *Aliciella cespitosa* during her study between 1992 and 1997 (with the exception of recruitment in 1995 and 1997). Her observations suggest that fluctuations in recruitment are primarily related to precipitation patterns and availability of safe germination sites (Dawson 1998). She found that sites with higher recruitment success were those with level, sandy soils in shaded or more mesic conditions. Her study found a high mortality of seedlings, with none surviving more than four years. Overall, she theorized that few seedlings become established, but once established they live for many years. A few seedlings were observed flowering in their second season, however these plants typically died soon thereafter (Dawson 1998).

Alston and Tepedino (2005) found extremely low visitation rates from potential pollinators that extrapolated to one pollinator visit per flower every 4.5 to 7 days. Correspondingly, seed set was also generally low and was 15%, 21%, 49%, and 85% in two areas over two years.

Additional information is needed regarding the stability of individual populations.

B. *Aliciella tenuis*

Aliciella tenuis is an herbaceous perennial found in cliff crevices or ledges or sandy slopes of Carmel, Dakota, Curtis, Summerville, Entrada and Navajo formations. Two known sites are associated with wash bottom or “arroyo” communities. Common associated plant species include pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), rubber rabbitbrush (*Chrysothamnus nauseosus*), Utah serviceberry

(*Amelanchier utahensis*), and little-leaf mountain mahogany (*Cercocarpus intricatus*). *Mussentuchit gilia* is known to occur between 5,000 and 7,500 feet elevation.

It has been found on all aspects and a wide variety of slopes, however nearly 60% of the sites found by the Interagency Rare Plant Team are on northern exposures. This may indicate a preference for cooler or moister locations in contrast to the hot dry conditions found on southern and western exposures.

All known sites are on coarse textured sandstones or sands. The majority of plants found are located in highly gypsiferous soils. *Aliciella tenuis* is found on formations that range from more or less calcareous substrates to nearly pure sand. The type locality is on the coarse sandy clays of Dakota formation. Many of the known sites found in Navajo Sandstone are directly beneath the highly gypsiferous layer of Carmel formation, or are in washes leading out of the Carmel formation. Analysis of soils from known sites would help to define soil nutrient needs of this species.

This and other species within *Gilia* section *Giliandra* were the subject of investigations of the evolution of breeding systems and reproductive biology (Porter 1993). *Aliciella tenuis* is a member of a closely related group of species, which display a reoccurring pattern of endemism and rarity. It is most likely pollinated by a suite of vectors very different from the typically hummingbird pollination of its close relatives. In addition, this species is a member of one of the several lineages of Polemoniaceae that have radiated into hot, low-elevation deserts from more mesic, high-elevation, montane habitats (Porter 1993).

Additional information is needed regarding the stability of individual populations, pollinators, demographics of populations, specific habitat requirements (such as soil chemistry, texture, or moisture), and reproductive strategies of this species.

C. *Astragalus harrisonii*

Harrison's milkvetch is found in pinyon-juniper woodlands and mixed desert scrub communities in slickrock sandstone. It is associated with rocky ledges, the sandy basins amongst sandstone domes, or in washes within the Navajo sandstone formation. This species is found between 5,400 and 6,400 feet elevation.

Alston and Tepedino (2005) suggest that, unlike some other species of *Astragalus*, *Astragalus harrisonii* flowers are not autogamous and require a pollen vector for successful reproduction. Bees, particularly *Apis mellifera* Linnaeus and *Osmia latisulcata* Michener, were the most commonly noted visitors to Harrison's milkvetch flowers during 2003 and 2004 (Alston and Tepedino 2005).

Alston and Tepedino (2005) found that Harrison milkvetch flowers go through several stages of development. The following is a description of what they found during their research in CARE. "Timing of the stages is highly dependent on temperature, position on the inflorescence, and the number of other open flowers on that inflorescence. Daytime highs in the 50s (°F) or lower can nearly stall flower development. Buds/flowers tend to be grouped in series of 2-3; the phenology within a series tends to be uniform but distinct from the development stage of the nearest series on either side. Position effects flower development as follows: the lowest flowers on an inflorescence are the first to open; they usually develop more rapidly than subsequent flowers farther up, especially if it is one of the first inflorescences to bloom on the plant. The timing of development for the uppermost flowers can also be influenced by the

number of flowers still open on the lower portion of the inflorescence. Upper buds develop very slowly when there are open flowers below.”

Additional information is needed regarding the stability of individual populations, demographics of populations, specific habitat requirements (such as soil chemistry, texture, or moisture), and reproductive strategies of this species.

D. *Cymopterus beckii*

Cymopterus beckii is found in cliff crevices or sandy canyon bottoms of Navajo Sandstone and Cutler formations. In Navajo National Monument and a few sites in CARE it is also found in seeps where water drains through the Navajo formation. Common associated plant species include little-leaf mountain mahogany (*Cercocarpus intricatus*), pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and virgin-bower (*Clematis ligusticifolia*). Welsh (2003) states *Cymopterus beckii* occurs between 6,500 and 7,500 feet elevation; however, a few sites have been found at 5,500 feet in CARE and up to 9,000 feet on FNF. At lower elevations, pinnate spring-parsley is restricted to north-facing, shady slot canyons in Navajo, Kayenta, or Wingate sandstones. At higher elevations it is found in less protected areas such as cracks and crevices of sandstone domes where it is exposed to direct sunlight for much of the day (Clark 1999).

Alston and Tepedino (2005) reported that pinnate spring-parsley has both male and hermaphrodite flowers. The female parts of the hermaphroditic flowers mature prior to the male parts (protogynous). Because of the arrangement of umbellets and the protogynous developmental sequence, they feel that fruit production probably requires pollinator visitation. The pollinators of pinnate spring-parsley are several species of small native sweat bees, family Halictidae.

Alston and Tepedino (2005) reported that, “The umbels of *Cymopterus beckii* go through several flowering phases. First, hermaphrodite florets of the outer umbellets (usually 4-6 outer umbellets) enter the female stage by extending their stigmatic surfaces. As the female stage ends, both hermaphrodite and outer male florets unfurl their stamens. As anther dehiscence begins, the inner staminate umbellets begin to unfurl their stamens and raise their anthers. At this point, the umbel is entirely male. As the inner umbellets’ male florets begin anther dehiscence, the inner florets of the outer umbellets, which are typically all male, begin to open their stamens and soon begin anther dehiscence. Each of these phases can take 3 to 5 or more days, leading to a umbel flowering “life” of 3 to 4 weeks (depending on temperature and season). If any of the hermaphroditic florets were pollinated, then fruit development follows, taking an additional 2 to 4 weeks after flowering ceases.”

Additional information is needed regarding the stability of individual populations, demographics of populations, specific habitat requirements (such as soil chemistry, texture, or moisture), and reproductive strategies of this species.

E. *Erigeron maguirei*

Maguire’s daisy is found primarily on the Navajo Sandstone. A few sites are located on Wingate Sandstone. The largest populations are found in cracks and crevices of Navajo sandstone cliffs and domes. Smaller populations are frequently found in the sandy canyon washbottoms. Common associated plant species include

pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), Utah serviceberry (*Amelanchier utahensis*), and little-leaf mountain mahogany (*Cercocarpus intricatus*) (Clark 2002). Van Buren (2002) reported Louisiana wormwood (*Artemisia ludoviciana*), broom snakeweed (*Gutierrezia sarothrae*), mountain pepperplant (*Lepidium montanum*), central pricklypear (*Opuntia polyacantha*), and Indian ricegrass (*Stipa hymenoides*) as the most common associated plant species at one of her sites in CARE. Heil (1993) described the community as Dwarf Mountain-Mahogany Slickrock, and states that this community is a Colorado Plateau Region endemic. Maguire's daisy has been found on all aspects and occurs between 5,000 and 8,500 feet in elevation.

Van Buren (2002) monitored plots in three populations of *Erigeron maguirei* from 1992 through 2001. She found that trends in mortality of mature plants tend to be low and stable from year to year. Established plants appear to be long lived even in ephemeral watercourses that experience flash flooding.

Alston and Tepedino (2005) showed that *Erigeron maguirei* flowers are primarily self-incompatible. Because of the open nature of the flower head, *Erigeron maguirei* tends to be visited by opportunistic insects searching for nectar. The primary flower visitors are the solitary composite specialist bee *Perdita aridella*, and several species of native sweat bees (family Halictidae). Florets need to be visited by pollinators, on average, only a few times for pollination to occur. Fruit set for this species does not appear to be a limiting factor with 15% to 30% of flowers containing fruit during any week of the appropriate season (Alston and Tepedino 2005).

For delisting, monitoring for long-term stability of populations is also needed.

VI. SPECIES DISTRIBUTION AND ABUNDANCE

A. *Aliciella cespitosa*

Rabbit Valley gilia is restricted to scattered occurrences in Wayne County, Utah from the northern Waterpocket Fold west to Thousand Lakes Mountain and south to Boulder Mountain. This species has a very restricted range known only from a relatively small area (Fig 1). In 1996 when the *Gilia caespitosa* Conservation Agreement and Strategy was completed, there were approximately 5,000 plants known from six areas. There are currently 50 known sites; four on FNF, ten on BLM, nine on DNF, 1 on state lands, and 26 on CARE. Additional sites occur on private land in the Torrey/Teasdale area. On a conservative basis, these areas contain approximately 22,800 individual plants (Table 1). Additional surveys are needed in the Black Ridge, Teasdale, Ant Hill, and Deep Creek areas.

B. *Aliciella tenuis*

Mussentuchit gilia is a rare species found within a limited range in south central Utah. All known occurrences are on federal or state lands in Wayne, Emery, and Sevier counties. The majority of occurrences are on lands managed by the BLM Price Field Office, but a few sites are located in the BLM Richfield Field Office area, within CARE and on State of Utah lands (Fig 2). Following the description of *Aliciella tenuis*, additional field surveys for this species were conducted between 1989 and 1993 by Ron Kass (BLM contract), by the Interagency Rare Plant Team (Groebner 2004, Lenhart

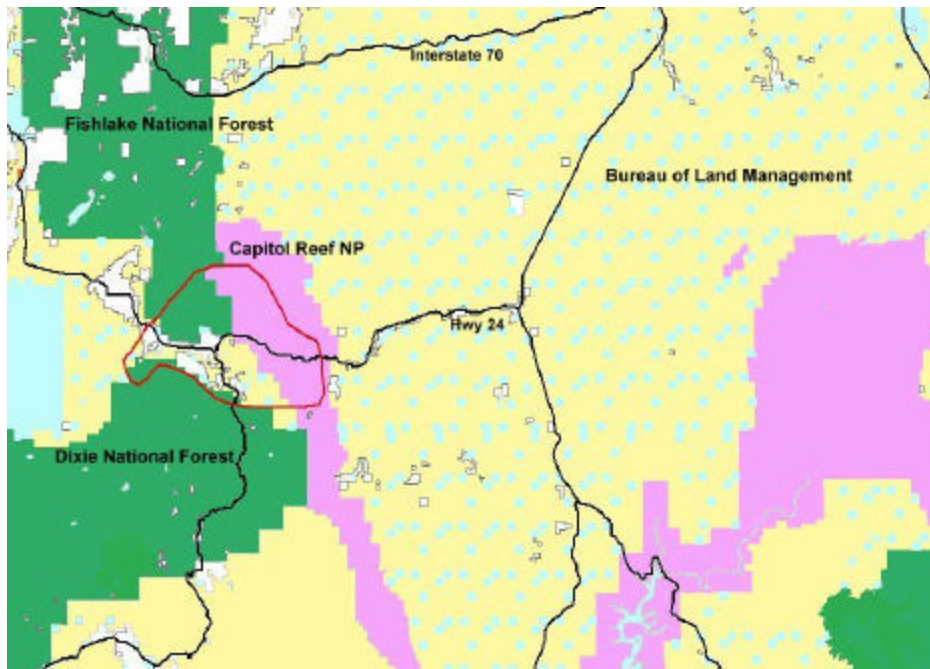


Figure 1. Distribution of *Aliciella cespitosa*. (State of Utah trust lands shown in light blue)

2005), and J. Mark Porter (1993 doctoral research, University of Arizona). Kass (1990a, 1990b) located plants near Secret Mesa, Prickly Pear Bend, and Coal Wash in the San Rafael Swell region.

From 2000 through 2005 the Interagency Rare Plant Team revisited six of the nine historically known *Aliciella tenuis* sites. Three of these six sites were subsequently visited a second time by the Team. An additional 31 new sites were discovered, and ten of these were subsequently revisited. There are approximately 15,000 plants in seven areas (Table 1).

All of the historically known sites were on BLM lands, although one of these sites includes some state of Utah land ownership. Eighteen of the newly discovered sites were entirely on BLM lands, five were on both BLM and state of Utah lands, seven were located within CARE, and one site was entirely on state of Utah lands. Additional surveys are needed to determine the extent of the range in CARE and in the San Rafael Swell.

C. Astragalus harrisonii

Harrison's milkvetch is only found in CARE. Until 1997, no extensive surveys had ever been conducted for Harrison's Milkvetch. It was thought to occur at four locations in Capitol Reef, totaling about 200 individual plants. Efforts from 1997-2002 confirmed those four locations and added 18 new localities within the park, totaling approximately 7,000 plants (Table 1). The range of this species appears to be limited to the Navajo Sandstone and adjacent talus slopes from Upper Deep Creek south to Pleasant Creek (Fig 3). An unpublished report (Anderson 1985) discusses plants found near the Purple Hills in Glen Canyon National Recreation Area by Porter and Heil (#5414) in

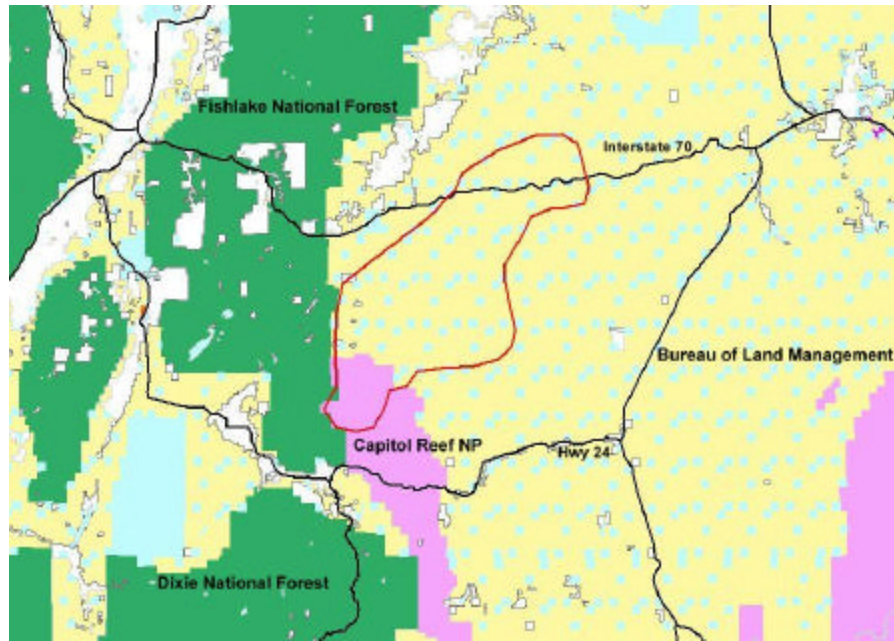


Figure 2. Distribution of *Aliciella tenuis*. (State of Utah trust lands shown in light blue)

1988. Other collections similar to this Glen Canyon collection have been made in the Grand Staircase-Escalante National Monument (also south of Capitol Reef). These collections were initially identified as *Astragalus harrisonii*, however, they are morphologically different and more closely resemble *Astragalus nidularis*. Walter Fertig, Deborah Clark and Christine Groebner attempted to find several of the sites reported in Grand Staircase-Escalante National Monument in May 2005, however no *Astragalus harrisonii* or similar appearing *Astragalus* were found. In Capitol Reef, *Astragalus coltonii* is a very similar species that overlaps the range of *Astragalus harrisonii* and, in a few locations the two species appear to hybridize. Additional surveys and genetics work are needed to refine the range of this species.

D. *Cymopterus beckii*

Pinnate spring-parsley has a non-contiguous distribution and is found in San Juan, Garfield, and Wayne counties, Utah and in Navajo National Monument, Arizona. Only nine localities, containing less than 2,000 plants were known prior to 1997. Three of the localities were in CARE, one on public lands managed by BLM just west of CARE, and five localities were on the Manti-LaSal National Forest in southeastern Utah. Since 1997, numerous sites and plants were found during surveys by the Interagency Rare Plant Team (Clark 2002). The following breakdown shows number of sites known by agency as of 2005: five on Manti-LaSal NF, ten on FNF, 35 on CARE, 13 on DNF, one on state lands and seven on BLM. On a conservative basis, these findings represent approximately 30,000 individual plants that were unknown in 1997. Holiday (2000) reported *Cymopterus beckii* occurring in seeps in Navajo National Monument, but she didn't report number of plants found. This finding constitutes a significant range extension to the south. Currently, 72 site locations (including Navajo National Monument, Arizona) containing approximately 36,000 individual plants are known (Table 1). Figure 3 illustrates the known range within the Agreement area of coverage.

Additional surveys are needed at the southern end of the range in CARE and off the east slope of Boulder Mountain on DNF in Kayenta formation canyons.

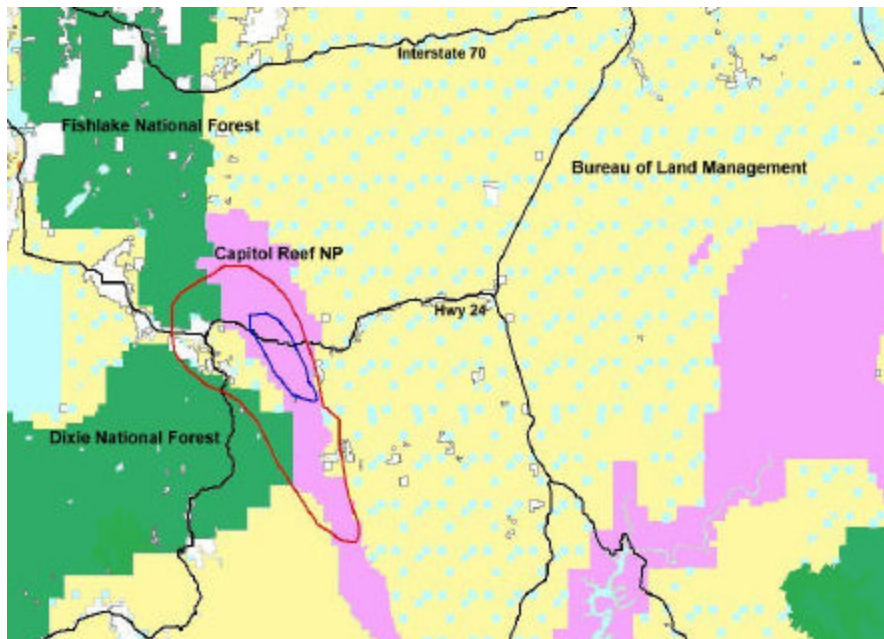


Figure 3. Distribution of *Astragalus harrisonii* (small circle) and *Cymopterus beckii* (larger circle) within the area of this Agreement. (State of Utah trust lands shown in light blue)

One population of *Cymopterus beckii* has been reported in Navajo National Monument (Holiday 2000) with an unknown number of plants. Another *Cymopterus beckii* population occurs in the Abajo Mountains on the Manti-LaSal National Forest and is estimated to contain about 3,000 plants. These two populations are not included in this Agreement.

E. *Erigeron maguirei*

Maguire's daisy is endemic to Wayne, Garfield, and Emery counties, Utah. The FWS recovery plan for *Erigeron maguirei* stated that there were 33 known locations representing seven separate areas containing about 5,000 individuals (FWS 1995). As of 2005, there were nine areas containing 118 locations of *Erigeron maguirei* occurring from the San Rafael Swell south through the Waterpocket Fold to the Circle Cliffs. The majority of individual plants for this species occur in CARE where many large new sites were documented (Clark et al. 2005). The total population, on a conservative basis, is about 162,700 individuals found in an approximate area of 390 square miles (Table 1 and Fig 4).

All areas are located on federal lands administered by BLM (Richfield and Price Field Offices), FNF, CARE, or on state land. Many of the sites on BLM are in Sids Mountain Wilderness Study Area (WSA), Muddy Creek WSA, and Devils Canyon WSA. Most of the CARE plants are located in proposed wilderness areas. No additional surveys are needed, but a revisit to the BLM Calf Canyon area is warranted to

determine if this population is still extant. This area has not been visited for over 15 years.

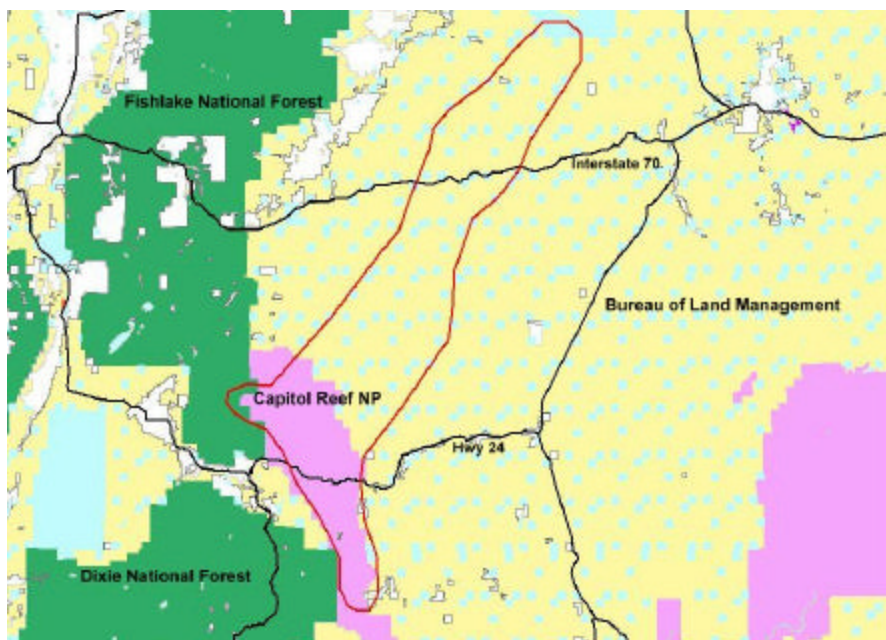


Figure 4. Distribution of *Erigeron maguirei*. (State of Utah trust lands shown in light blue)

Table 1. Estimated number of individual plants by management agency.

	CARE NPS	Fishlake NF	Dixie NF*	BLM	State	Total
<i>Aliciella cespitosa</i>	7,400	5,200	5,000	5,330	70	22,800
<i>Aliciella tenuis</i>	4,900	N/A	N/A	9,300	800	15,000
<i>Astragalus harrisonii</i>	7,000	N/A	N/A	N/A	N/A	7,000
<i>Cymopterus beckii</i>	7,500	18,000	2,500	5,000	40	36,000
<i>Erigeron maguirei</i>	150,000	1,000	N/A	9,700	2,000	162,700

* Lands within the area of this Agreement on Dixie National Forest are administered by Fishlake National Forest.

VII. INVOLVED PARTIES

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Fishlake National Forest
115 East 900 North
Richfield, Utah 84701

U.S.D.I., National Park Service
Capital Reef National Park
HC 70, Box 15
Torrey, Utah 84775

U.S.D.I., Fish and Wildlife Service
Utah Field Office
2369 West Orton Circle, Suite 50
West Valley City, Utah 84119

U.S.D.I., Bureau of Land Management
Richfield Field Office
150 East 900 North
Richfield, Utah 84701

U.S.D.I., Bureau of Land Management
Price Field Office
125 South 600 West
Price, Utah 84501

VIII. AUTHORITY

All parties to this Agreement recognize that each agency has specific statutory responsibilities that cannot be delegated, particularly with respect to the management and conservation of T E & S species and the management and development of public land resources. Nothing in this Agreement is intended to abrogate any of the parties' respective responsibilities. This Agreement is also subject to and is intended to be consistent with all applicable Federal and State laws and regulations.

The Endangered Species Act of 1973, as amended, Section 2, establishes the Act's purpose to, "...provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved..." Section 5 directs the Secretaries of The Department of Agriculture and the Department of the Interior to "... establish and implement a program to conserve fish, wildlife, and plants..." Section 3 (3) defines the terms "conserve", "conserving," and "conservation" as the means to use and the use of all methods and procedures which are necessary to bring any endangered or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary (FWS 1973).

Section 7(a) (1) directs the Secretary of the Interior (or Secretary of Commerce, for marine species) to review other programs administered by them and utilize such programs to further the purposes of the Act. It also directs all other federal agencies to utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of species listed pursuant to the Act. Authorities to conduct consultations under Section 7 have been delegated by the Secretary of the Interior to the Director of the FWS. Although it is beyond the scope of these regulations to address how other Federal agencies should implement and exercise their authority to carry out conservation programs under section 7 (a) (1), the FWS provides assistance in developing and carrying out conservation programs, as these programs can be subject to consultation requirements if they "may affect" species.

The National Forest Management Act (1976) directs National Forests to manage habitat to maintain viable populations of existing native and desired non-native vertebrate species in habitat distributed throughout their geographic range on National Forest System lands. In 1983, USDA Departmental Regulation 9500-4 provided further direction to the Forest Service, expanding the viability requirements to include plant species. Forest Service Manual (FSM 2670) Direction on endangered, threatened, and sensitive species directs the agency to: a) develop and implement management

practices to ensure that [sensitive] species do not become threatened or endangered because of Forest Service actions; b) maintain viable populations of all native and desired non-native fish, wildlife, and plant species throughout their geographic range on NFS lands, and; c) develop and implement management objectives for populations and/or habitat of sensitive species.

Bureau of Land Management Manual 6840 provides guidance for the conservation of Federally Listed and other Special Status Species and the habitats on which they depend. Conservation of listed species means to use all methods and procedures that are necessary to bring a listed species to the point at which measures of the ESA no longer apply. Methods and procedures of conservation include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, and transportation. As applied to special status species, conservation means to use, and the use of, methods and procedures such that there is no longer any threat to their continued existence or need to continue their status as a special status species.

National Parks are administered under the provisions of the Act of August 25, 1916, 16 U.S.C. Ss 1, 2-4, as amended, which created the NPS. The fundamental purpose of this Act is to “conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

NPS Management Policies (2001) on Threatened and Endangered Plants and Animals states, “The (National Park) Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the ESA. The (National Park) Service will fully meet its obligations under the NPS Organic Act and the ESA to both pro-actively conserve listed species and prevent detrimental effects on these species. These policies further state that “To meet these obligations, the (National Park) Service will ... cooperate with other agencies, states, and private entities to promote candidate conservation agreements aimed at precluding the need to list species. The National Park Service will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species, to the greatest extent possible. In addition, the (National Park) Service will inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and will manage them to maintain their natural distribution and abundance.”

The FWS and NMFS agree to promote the conservation of candidate, proposed, and listed species and to informally and formally consult/confer as specified in the Interagency Cooperation Regulations 50 CFR 402 on listed and proposed species, and designated and proposed critical habitat during planning: (1) To assure that activities implemented under these plans minimize or avoid adverse impacts to such species and any critical habitat; (2) to assure that such activities implemented under these plans do not preclude future conservation opportunities; (3) to use, where possible, consultation procedures specified in 50 CFR 402 to avoid conflicts between elements contained in plans and the requirements for conservation of proposed species and proposed critical habitat; and (4) to analyze the effects of the plan on candidate species pursuant to agency planning regulations.

The national interagency Memorandum of Understanding (MOU) for the conservation of species tending towards federal listing issued on January 25, 1994 (94-SMU-058) provides the general framework for cooperation and participation among cooperators in conservation of these species. This Agreement is consistent with the provisions of the national interagency MOU.

IX. AGREEMENT TERM

This Agreement shall be effective as of the date of the last signature and shall remain in force for a period of ten years or until such time as the participating parties agree to terminate this Agreement.

X. PROCEDURAL PROVISIONS

A. An Executive Committee comprised of the signatories to this Agreement, or their designated representatives, is responsible for the implementation of this Agreement. The Executive Committee will approve annual conservation action schedules and seek necessary financial and staffing resources to accomplish the Conservation Agreement tasks.

B. An Interagency Technical Team has been established and they will be the principal contacts for this Agreement.

C. Membership on the Navajo Sandstone Endemic Interagency Technical Team includes one employee each from the U.S.D.A. Forest Service, Fishlake National Forest, U.S.D.I. BLM Utah State Office, BLM Richfield and Price Field Offices, U.S.D.I. FWS Utah Field Office, and U.S.D.I. NPS Capitol Reef National Park (see Appendix C). Each agency may change its Team member as necessary due to personnel changes. This Team will meet annually, or as necessary, to review accomplishments and make recommendations to the Executive Committee for developing yearly conservation action schedules. The Team may make group decisions as to which actions are priorities for the subsequent year(s). Conservation actions will be approved annually by the Executive Committee and appended to the Strategy.

D. Team members will report to their appropriate line officers on accomplishments, priorities, and needs. The responsible federal officials still retain appropriate line officer authority for decision documents, resource allocation, personnel, and budgetary management.

E. This Agreement may be modified or amended as necessary upon review of the proposed amendments by the Executive Committee and written consent of all parties. This Agreement may be terminated by any party with a 60 day written notice to all parties.

F. This Agreement is not a fiscally or a financially obligating document. Any endeavor involving reimbursement or contribution of funds among the parties of this Agreement will be handled by each individual agency and administrative unit in accordance with applicable laws, regulations, and procedures. Once this document is approved, each agency involved will pursue funding to implement the actions identified in this Agreement. Approval of this Agreement is a necessary prerequisite to funding requests. Funding for the Agreement may be provided by a variety of sources. Federal funding sources include, but will not be limited to NPS, USFS, FWS and BLM management funds. In-kind contributions in the form of personnel, field equipment, supplies, etc. may be provided by government, non-government entities or private groups.

G. It is understood that all funding and other agency resource commitments made under this Agreement are contingent upon appropriations by each Federal entity.

H. Conservation actions identified (in Strategy section IV) will be completed within ten years from the date of the last signature on this Agreement or until such time as the participating parties agree to terminate this Agreement.

I. Prior to the end of the ten-year Agreement period, the Interagency Technical Team will conduct a thorough analysis of the conservation actions undertaken. Results of these actions will be prepared as a written report to the Executive Committee.

J. Any information furnished to the Forest Service, about NFS lands, under this instrument is subject to the Freedom of Information Act (5 U.S.C. 552).

XI. National Environmental Policy Act (NEPA) and Federal Agency Compliance

This Conservation Agreement is being developed for planning purposes. Before any on-the-ground actions can occur on federally managed lands, a determination must be made whether or not the conservation actions are consistent with the applicable agency's land use or land management plan and whether or not additional NEPA analysis is required. If conservation actions are determined not to be consistent with a land management plan, then these actions must be incorporated into the applicable agency's land use or land management plan through an amendment or maintenance process before they can be implemented. Actions on lands administered by the State or private lands may not be subject to NEPA analysis.

During the performance of this Agreement, participants agree to abide by the terms of Executive order 11246 on non-discrimination and will not discriminate against any person because of race, color, religion, sex or national origin.

No member or delegate to Congress or resident Commissioner shall be admitted to any share or part of this Agreement, or to any benefit that may arise there from, but this provision shall not be construed to extend to this Agreement if made with a corporation for its general benefit.

If threats to the survival of any of the Navajo Endemic species are identified that are not or cannot be resolved through this Conservation Agreement, the FWS will

immediately notify all signatories. The Interagency Technical Team will, at that time, make a diligent effort to modify this Agreement or attached Conservation Strategy to incorporate and implement needed conservation measures for the Navajo endemics. If these revised measures prove inadequate for the species' conservation, the FWS reserves all obligations required by, and options offered by, the ESA of 1973, as amended, including listing under the provisions of Section 4 of the Act.

XII. Principal Contacts

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XIV. SIGNATURE APPROVAL

In Witness Whereof, the parties have caused this Central Utah Navajo Sandstone Endemics Conservation Agreement to be executed as of the date of last signature below:

APPROVED:

Mary Erickson, Forest Supervisor
USDA, Fishlake National Forest
Richfield, Utah

Date

Albert J. Hendricks, Superintendent
USDOI, Capitol Reef National Park
Torrey, Utah

Date

Larry Crist, Acting Field Supervisor
USDOI, Utah Field Office, Fish and Wildlife Service
West Valley City, Utah

Date

Henri Bisson, Acting State Director
USDOI, Utah State Office, Bureau of Land Management,
Salt Lake City, Utah

Date

Conservation Strategy

I. GOAL

The goal of this Conservation Strategy is to provide a framework for the resolution of identified management concerns and current threats to the Navajo endemics. Several populations for each species are located where human activities could lead to the need to consider listing one or more of these species as threatened or endangered. Other management activities could also pose threats without a proper strategy in place to mitigate or avoid such actions.

Conservation of these Navajo endemics depends upon successful management and protection of populations and their habitats throughout the species' ranges. For management efforts to be truly successful for any rare plant species, a broad-based management plan is needed to provide for the reduction of current and potential threats along with the preservation of abiotic and biotic factors associated with the Navajo endemics. The primary focus of this Strategy is to outline the measures necessary to reduce or eliminate current and potential threats to the Navajo endemics. In addition, the lack of sufficient biological and long-term data for some of these species compels the agencies to design and implement a Strategy that focuses on determining the species' biological and ecological needs. Biological and ecological needs may include the reproductive biology, pollination ecology, population demography, and habitat dynamics of the Navajo endemics. This information will then be utilized to understand the requirements of the Navajo endemics for persistence, to predict future trends for the population, and to minimize the risks of extinction.

II. MANAGEMENT CONCERNS

The following management concerns were considered and analyzed with respect to the Navajo endemics; motorized recreational use, non-motorized recreational use, road building and maintenance, trail building and maintenance, oil and gas, mining, sand and gravel quarrying exploration and development, pesticide use, collection, livestock use, land exchange, and biological impacts. In addition, reproductive depression and low recruitment are important risk considerations for some of these species.

Due to the complexity of these concerns in connection with multiple agency jurisdiction and management policies, a table was created to discuss each threat by species and by area (Appendix A). All known sites for each species were reviewed by Interagency Rare Plant team members to determine threat levels. The following paragraphs (with the exception of biological impacts, reproductive depression and low recruitment) summarize the threats by area and agency; detailed information regarding these threats by species is found in Appendix A. Potential impacts by threats are summarized in Table 2.

A. Motorized Recreational Use

Some areas of Navajo endemics are adjacent to recreational trails and four-wheel-drive roads (Appendix A); however, most plants and sites occur on cliffs and crevices inaccessible to OHV's. Portions of BLM managed lands within the range of *Aliciella tenuis* and *Aliciella cespitosa* have potential for impacts from off highway vehicle (OHV) use. Portions of Forest Service managed lands within the range of *Aliciella cespitosa* and *Cymopterus beckii* have potential for impacts from OHV use.

Both national forests and both BLM field offices are currently working on designated route plans that may change the open access in these areas. The proposed route designation plans would restrict travel to designated open areas and routes, replacing the existing plans that allow unrestricted travel. OHV use results in habitat degradation and modification, such as soil compaction, increased erosion, or soil instability that could indirectly impact plants. Potential impacts to plants growing adjacent to roads and OHV trails may include trampling, collection, crushing and being covered by dust thrown up by vehicular traffic. Since no monitoring for OHV impacts to these plants has been conducted, areas with potential for these impacts should be monitored.

B. Non-Motorized Recreational Use

A few Navajo endemic sites are adjacent to existing trails (Appendix A); however, most plants grow on cliffs and crevices in areas inaccessible to most non-motorized recreation. The heaviest non-motorized recreational use in the Strategy area occurs on trails near the Fruita Valley in CARE. Visitor activity in CARE is concentrated on four trails in the Fruita area and impacts to rare plant habitat have been observed at these locations. These trails have been signed to educate visitors about rare plants and to help reduce impacts. This signing has reduced but not eliminated off trail travel. If visitation increases, the potential for direct and indirect impacts increases. In 1998, CARE initiated a monitoring program for *Astragalus harrisonii* and *Cymopterus beckii* to determine whether plants growing in or adjacent to hiking trails were being impacted by visitor trampling. Both maintained trails and unmaintained routes were monitored through 2001. Preliminary data show that plants growing adjacent to trails or routes received minor trampling, with respect to the control plots located away from the footpaths which received no trampling. These monitoring efforts did not find mortality associated with trampling but monitoring should be continued to more fully understand non-motorized recreational impacts.

Monitoring may also be required in other areas to evaluate habitat impacts. There is a historic pack trail through *Aliciella cespitosa* occupied habitat on FNF that receives light use. In several areas on BLM managed lands, dispersed camp areas and trails adjacent to Navajo endemic sites have potential for low to moderate impacts.

C. Road Building, Road Maintenance, and Utility Corridors

Maintenance or improvement of two park roads within CARE has the potential to impact *Astragalus harrisonii* because the plants occur very close to the road shoulders (Appendix A). Road improvements (widening, new drainage cuts, new construction, etc.) at some BLM locations may impact two *Aliciella tenuis* sites. Impacts from these activities could modify habitat and result in removal of a few individual plants.

There are no utility corridors within or adjacent to known Navajo endemic occurrences. Any proposals for new roads, utility corridors, or change in maintenance activities would be evaluated for potential impacts to these species.

D. Trail Building and Maintenance

Building and maintenance of non-motorized trails in CARE along four trails in the Fruita area could impact individual *Aliciella cespitosa* and *Astragalus harrisonii* plants (Appendix A). Pack trail maintenance near the Ant Hill on FNF could potentially impact *Aliciella cespitosa*. Such activities could result in the direct loss of individual plants, but there are few plants with potential for impacts. Any proposal for new trails or change in maintenance activities would be evaluated for potential impacts to these species.

E. Oil and Gas Exploration and Development, Mining, and Sand and Gravel Quarrying

Much of the BLM portion of the *Erigeron maguirei* and *Aliciella tenuis* ranges are adjacent to areas that have high potential for gypsum mining (Appendix A). The South Salt Wash, Muddy Creek, and Secret Mesa *Aliciella tenuis* sites are adjacent to existing gypsum mines. The Last Chance *Aliciella tenuis* area is adjacent to an existing bentonite mine; however, the mine is located in the Morrison formation where this species is not known to occur.

BLM and Forest Service managed lands are open to oil and gas leasing; however, potential is low in the Navajo Sandstone formation where these species primarily occur. If leases are awarded and development approved through an application for permit to drill (APD), effects from such activities could directly and/or indirectly modify habitat. However, APD's for any leasable mineral may have the location of developments adjusted to avoid or reduce impacts to these species. Oil and gas lease sales will contain a lease notice that states: Modifications to the Surface Use Plan of Operations may be required in order to protect these species or their habitat in accordance with Section 6 of the lease terms, Endangered Species Act, and CFR 3101.1-2.

Sand, gravel, and decorative rock quarrying are discretionary uses that are open throughout the habitat of Navajo endemics, but these actions would be reviewed by land managers prior to approval. These plans may be disapproved or allowed with modifications to avoid impacts to these species. There are currently no quarries within Navajo endemics habitat.

Locatable mineral potential (such as gold or uranium) is low and no mines exist within the Navajo Sandstone formation where these species occur.

Activities pertaining to oil and gas exploration and development, mining, and sand and gravel quarrying would be evaluated for potential impacts to these species prior to approval.

F. Pesticide Use

Pesticide use would include herbicides and insecticides (Appendix A). These agencies are not using herbicides where these species occur. Noxious weeds do not typically grow in substrates preferred by the Navajo endemics. Insecticides are used in CARE fruit orchards within a half mile of several Navajo endemic sites to control the Codling moth. Other pesticides may be used on private lands in the Black Ridge

agricultural area which is within one mile of a known *Aliciella cespitosa* site. Impacts from pesticide use could include reduction in pollinators, individual plant mortality or reduced plant vigor.

A joint three-year study by CARE and Utah State University examined this issue for most of the Navajo endemic species. Alston and Tepedino (2005) found no indication that insecticide spraying in Fruita orchards is having a detrimental effect on the Navajo endemic species or their pollinators. In addition, these results would likely apply to the Black Ridge *Aliciella cespitosa* site. No management actions are proposed in this Strategy for this factor because we do not anticipate any impacts.

G. Collection

Collection of Navajo endemics is a potential threat due to the desire of rock garden enthusiasts to obtain attractive native plants (Appendix A). However, to date, collection has only been documented at the Teasdale population of *Aliciella cespitosa*. This species is especially at risk from this activity due to its showy blooms, and direct removal of plants could impact sustainability of sites. Collection activities have the potential to impact long-term existence of any the Navajo endemics.

Seed collection of Navajo endemics could reduce reproductive success of sites. Currently, *Aliciella cespitosa* seeds are being sold in rock-gardening catalogs, although the site where seeds are being collected is undisclosed. Maguire's daisy is not a highly collected or sought after species; however, one group in Europe is propagating *Erigeron maguirei* for rock garden enthusiasts.

Known or suspected collection sites for any of the Navajo endemics would be monitored for illegal activity.

H. Livestock Use

Livestock use, including cattle trailing, occurs within the Navajo endemics habitat (Appendix A). Most Navajo endemics sites occur within active livestock grazing allotments (see Appendix B); however, these species primarily occur on cliffs or in rock crevices that are inaccessible to livestock. Therefore, potential impacts from livestock use are low. Appendix A lists areas with sites that are accessible to livestock. Monitoring for potential impacts needs to be initiated in these areas. Potential impacts include trampling of individual plants and soil/vegetation changes that may reduce habitat suitability for these species.

I. Land Exchange

Some parcels of BLM and Forest Service managed lands around Torrey and Teasdale contain *Aliciella cespitosa* and *Cymopterus beckii* sites (Appendix A). These lands have the potential to become part of land exchanges to the state of Utah. State managed lands throughout the range of the Navajo endemics have the potential to be sold to private individuals. Any lands exchanged out of federal ownership may result in loss of individual plants or habitat.

Lands containing Navajo endemics will not be identified by the agencies for disposal, exchange, etc. in management plans. Also, prior to exchanging any federal lands that may contain suitable habitat for these Navajo endemics, selected lands would be surveyed at the appropriate time of year for these species. Presence of Navajo

endemics would be considered during the land exchange process and lands containing these species would only be exchanged if BLM and FS regulations (BLM Regulation 43 CFR 2200 and FS Regulation 36 CFR 254) and policies are met. These regulations state that lands which contain significant elements of value will not be exchanged unless the exchange results in a net gain of important and manageable resource values on public lands such as crucial wildlife habitat, significant cultural sites, high-value recreation areas, high-quality riparian areas, live water, threatened and endangered species habitat, or areas key to the maintenance of productive ecosystems.

J. Other Biological Impacts

Little is known about the effects to Navajo endemics resulting from natural threats such as disease, parasitism, and grazing by native species. Desert bighorn sheep browse *Astragalus harrisonii* plants in some areas in CARE. Impacts of this activity are unknown and may be at natural levels.

No known diseases have been reported in this suite of species or their pollinators. It is unknown whether current plant numbers at each site are at levels that will assure long-term demographic and genetic variability.

The potential for impacts by fire, either prescribed or naturally ignited, is very low within the habitat occupied by this suite of species. Potential is low due to lack of fuels to sustain a fire.

Non-native, invasive weeds do not typically grow in substrates preferred by the Navajo endemics and are not known to be a threat.

Population trend monitoring is needed to determine if these factors impact any life stage of these species.

K. Reproductive Depression and Low Recruitment

Research (see section VII) generated some baseline information with regard to reproduction and recruitment of some of the Navajo endemics. Carol Dawson studied *Aliciella cespitosa* from 1992 through 1997. *Aliciella tenuis* and other species within *Gilia* (*Aliciella*) section *Giliandra* were the subject of investigations of the evolution of breeding systems and reproductive biology (Porter 1993). Alston and Tepedino (2005) studied pollinators, flowering biology, and seed set of all the Navajo endemics except *Aliciella tenuis* for three years within and adjacent to CARE. Van Buren (2002) studied recruitment and survivability of *Erigeron maguirei* at several sites on BLM and CARE from 1992 through 2001. There is currently no ongoing research or life history monitoring occurring for any of the Navajo endemics.

Additional study and investigation with regards to life history and recruitment levels is needed primarily for *Astragalus harrisonii*, *Aliciella tenuis*, and *Cymopterus beckii*.

III. OBJECTIVES

To maintain stable populations of the Navajo endemics, the primary objectives of this Conservation Strategy are:

1. Identify occurrences and determine the distribution of each species.
2. Determine the important habitat characteristics necessary to conserve and maintain persistent populations for each species.

Table 2. Summary of potential for impacts by species as described in preceding text and Appendix A. See Appendix A for a detailed explanation of the level of impact.

	<i>Aliciella cespitosa</i>	<i>Aliciella tenuis</i>	<i>Astragalus harrisonii</i>	<i>Cymopterus beckii</i>	<i>Erigeron maguirei</i>
Motorized Recreation	Potential for impact	Potential for impact	none	none	Potential for impact
Non-Motorized Recreation	Potential for impact	none	Potential for impact	none	none
Road Building and Maintenance	Potential for impact	Potential for impact	Potential for impact	none	none
Trail Building and Maintenance	Potential for impact	none	Potential for impact	none	none
Oil and Gas Exploration, mining	Potential for impact	Potential for impact	none	Potential for impact	none
Pesticide Use	none	none	none	none	none
Collection	Potential for impact	none	none	none	Potential for impact
Livestock Use	Potential for impact	Potential for impact	none	Potential for impact	Potential for impact
Land Exchange	Potential for impact	Potential for impact	none	Potential for impact	Potential for impact
Other Biological Impacts	Potential for impact	Potential for impact	Study needed	Study needed	none
Low Recruitment	Potential for impact	Study needed	Study needed	Study needed	none

3. Determine if ongoing agency land use practices adversely impact these species.
4. Identify and implement the conservation measures needed to reduce threats to each species.
5. Identify and implement management actions and guidelines that will help maintain long-term sustainability and conservation of each species.
6. Implement existing regulatory mechanisms available to provide for long-term management to sustain populations of Navajo endemics.

7. Determine life history dynamics and trends through monitoring for each species as needed. Duration of monitoring is commensurate with population stability and threat levels for each species. This will enable the agencies to monitor effectiveness of conservation activities to ensure that their results are beneficial. Data will be collected under written protocols or as part of related research activities. These results will be used to evaluate and modify this Strategy.
8. Determine if the Navajo endemics are at risk from potential impacts identified in Table 2.
9. Establish ex-situ germplasm collections for each of the Navajo endemics with the Center for Plant Conservation (CPC) and its participating institutions.

IV. CONSERVATION ACTIONS NEEDED

Conservation actions proposed in this Strategy provide the framework needed to reduce or eliminate anthropogenic threats and to promote the conservation and perpetuation of the Navajo endemics. These actions are derived from the previous sections and are designed to mitigate known threats to these species.

An Interagency Rare Plant Agreement established in 1999 between BLM, CARE, DNF and FNF enabled the agencies to create an Interagency Rare Plant Team. This team works throughout the range of target species regardless of agency boundaries conducting surveys for these and other rare plant species. Having an interagency team available to accomplish actions listed below is far more cost effective than having each agency hire or contract with individual botanists to complete required tasks. Therefore, costs by action in Tables 2 through 11 and the total cost estimate for each species by agency reported in Table 12 are based on having an Interagency Rare Plant Team accomplish many of these actions. If an Interagency Rare Plant Team is not available, or utilized, to accomplish the actions listed below, cost per species per agencies could be much greater.

This Conservation Strategy is not a fiscally or financially obligating document. However, once the Agreement and Strategy are approved, each agency will pursue funding to implement the actions identified in this Strategy. Actions will be completed as funds become available and may not be completed in the years presented. They have not been prioritized since priorities will undoubtedly change over the time frame of this agreement as more knowledge is gained on each species.

A. Inventory remaining suitable habitat for each of the Navajo endemics. Determine the number of individuals in each occurrence and the overall distribution for each species.

Agency representatives would verify previously known occurrences and record new locations found using forms compatible with the Utah Natural Heritage Program form. The Agencies would develop and implement a survey plan for all suitable habitats that remain to be surveyed within the area covered by this Strategy.

Extensive surveys have been conducted for each of these species since 1997. CARE received two years of funding through a Canon U.S.A., Inc. grant to inventory these species within the park. This work was accomplished in 1997 and 1998. In 1999, the federal agencies involved in this Strategy entered into the Interagency Agreement that created an Interagency Rare Plant team to survey for these and other species throughout their ranges. This work began in 1999 and has continued to date.

Inventory results would help determine with a high degree of accuracy the number of occurrences, specific habitat characteristics, and distribution for each species. See Table 3 for specific areas still requiring surveys. This action will help satisfy portions of objectives 1 and 2.

Table 3. Inventory needs.

Conservation Action	Species	Responsibility	Estimated Cost*	Time Frame*
Inventory Remaining Suitable Habitat	<i>Aliciella cespitosa</i>	NPS CARE - Deep Creek area	\$2,000/yr for 2 yrs	FY07/08
		FNF - Ant Hill, Deep Creek and Teasdale areas	\$2,000/yr for 3 yrs	FY07 thru FY09
		BLM Richfield - Black Ridge, Ant Hill areas	\$2,000/yr for 2 yrs	FY07/08
	<i>Aliciella tenuis</i>	NPS CARE - South Desert area	\$2,000/yr for 2 yrs	FY07/08
		BLM Price - unsurveyed habitat from Coal Wash in San Rafael Swell south to CARE	\$2,000/yr for 4 yrs	FY07 thru FY10
		FNF - Deep Creek area	\$1,000/yr for 2 yrs	FY07/08
	<i>Astragalus harrisonii</i>	NPS CARE - Deep Creek and Pleasant Creek areas	\$4,000/yr for 4 yrs	FY07 thru FY10
	<i>Cymopterus beckii</i>	FNF - east slope of Boulder Mtn, in Kayenta formation canyons	\$2,000/yr for 2 yrs	FY07/08
		NPS CARE - southern end of range	\$2,000/yr for 4 yrs	FY07 thru FY10
	<i>Erigeron maguirei</i>	BLM Price – revisit Calf Canyon area	\$2,000/yr for 2 yrs	FY07/08

*Actions will be completed as funds become available and may not be completed in the years presented.

B. Identify research needs and conduct studies to include biological, ecological, and life history dynamics for each species.

Biological and ecological studies are needed to determine factors controlling distribution, abundance, and interactions within the ecosystem. Additional information is

needed concerning pollination processes or threats such as disease, or parasitism. This research is needed to evaluate results from monitoring studies.

Life history studies including mortality, recruitment, and area stability were done for *Erigeron maguirei* from 1992 through 2001. Similar studies including mortality and recruitment were done for *Aliciella cespitosa* from 1992 through 1997. Additional work on longevity and recruitment is needed for *Astragalus harrisonii*, *Cymopterus beckii*, and *Aliciella tenuis*. Additional work on specific habitat requirements and life history is needed for all but *Erigeron maguirei* and *Aliciella cespitosa*.

Genetic work to determine species relationships is needed for *Astragalus harrisonii* and similar species that occur in Glen Canyon National Recreation Area, Grand Staircase-Escalante National Monument and CARE.

Three years of pollination studies were conducted on all species except *Aliciella tenuis*. These studies identified native pollinators and reproductive strategies for *Astragalus harrisonii*, *Cymopterus beckii*, *Erigeron maguirei* and *Aliciella cespitosa*. Pollination studies are still needed for *Aliciella tenuis*. See Table 4 for details of research and studies required. This action will help satisfy portions of objectives 3, 5, and 7.

C. Refine established Population Trend monitoring protocols and implement at selected sites for each species.

Regular monitoring is needed to determine area trends. This is best gathered using presence / absence or population trend monitoring for each species to determine whether the agencies are maintaining persistent, stable populations throughout their ranges. Areas with greater abundance would be monitored for population trend to determine whether the general population is stable, increasing or decreasing. If monitoring detects a decline at any of the sites, then monitoring would shift to either a more intensive protocol for determining trend, or include additional sites of population trend monitoring for a minimum of three years to determine if the initial decline noted is real. This information is also required to determine if agency actions and guidelines are maintaining the species. See Table 5 for population trend monitoring needs. This action will help satisfy portions of objectives 2, 4, and 5.

D. Develop human impact monitoring protocols and implement impact monitoring at selected sites for each species as needed. Include research on potential impacts resulting from multiple land uses.

Appendix A identifies specific threats by species and by area. Monitoring protocols need to be developed for each moderate or high level threat noted in Appendix A and Table 2. Once protocols are developed, locations with moderate to high threat levels should have monitoring plots established to determine whether the stated threats impact the species. Following protocol development, sites with potential human related impacts need to be reviewed for monitoring.

Plots were established in CARE and monitored from 1999 through 2002 for potential impacts of visitor use on *Astragalus harrisonii* and *Cymopterus beckii*. These plots need to be reestablished with updated monitoring protocols to address visitor

impacts. See Table 6 for locations proposed for human impact monitoring. This action will help satisfy portions of objectives 3, 5, 7, and 8.

Table 4. Research and studies needed.

Conservation Action	Species	Responsibility	Estimated cost*	Time Frame*
Establish & Conduct Life History and Habitat Requirement Studies (total cost is broken down by agency)	<i>Aliciella tenuis</i>	BLM Price	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
		BLM Richfield	not applicable	
		NPS CARE	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
	<i>Astragalus harrisonii</i>	NPS CARE	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
	<i>Cymopterus beckii</i>	NPS CARE - Fruita area	not applicable	
		FNF	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
Conduct Genetic Analysis	<i>Astragalus harrisonii</i>	NPS CARE - conduct genetic analysis to determine species relationships between <i>A. harrisonii</i> and closely related species found south of and within CARE	\$20,000	FY09 thru FY11
Conduct Pollination Studies	<i>Aliciella tenuis</i>	BLM Price	\$7,500	FY11 thru FY13
		NPS CARE	\$7,500	FY11 thru FY13

*Funded as resources become available from grants and agreements from academic institutions or private funds. Actions will be completed as funds become available and may not be completed in the years presented.

E. Implement established land management plans and regulations to provide for protection of the Navajo endemics and their habitat.

The agencies shall continue to implement management plans to conserve special status species and their habitats and to ensure that actions authorized, funded, or carried out by the agencies would not contribute to the listing of a species. Land

managers would continue to manage these species with the intent to maintain their distribution and abundance.

Future planning documents would address the objectives listed above for the Navajo endemics and their habitat. Actions identified in this Conservation Strategy would be incorporated into revisions of each agency's land use and resource management plans, as applicable.

Table 5. Population Trend monitoring needed.

Conservation Action	Species	Responsibility	Estimated cost*	Time Frame*
Establish & Conduct Population Trend Monitoring Studies (includes monitoring protocol development)	<i>Aliciella cespitosa</i>	NPS CARE	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
		BLM Richfield	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
		FNF	\$2,000 for first yr, \$1,000/yr for 9 yrs	FY07 thru FY17
	<i>Aliciella tenuis</i>	BLM Richfield	not applicable	FY07 thru FY17
		BLM Price	\$2,000 for first yr, \$1,000/yr for 9 yrs	FY07 thru FY17
		NPS CARE	\$2,000 for first yr, \$1,000/yr for 9 yrs	FY07 thru FY17
	<i>Astragalus harrisonii</i>	NPS CARE	\$2,000 for first yr, \$1,000/yr for 9 yrs	FY07 thru FY17
	<i>Cymopterus beckii</i>	NPS CARE	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
		BLM Richfield	not applicable	FY07 thru FY17
		FNF	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
	<i>Erigeron maguirei</i>	BLM Price	\$2,000 for first yr, \$1,000/yr for 9 yrs	FY07 thru FY17
		NPS CARE	\$2,000 for first yr, \$1,000/yr for 9 yrs	FY07 thru FY17
		FNF	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17

*Actions will be completed as funds become available and may not be completed in the years presented.

Any proposed action within suitable habitat would be evaluated to ensure compatibility with the objectives of this Strategy and existing agency policies and

Table 6. Human related impact monitoring needed.

Conservation Action	Species	Responsibility	Estimated cost*	Time Frame*
Establish & Conduct Impact Monitoring Studies (includes monitoring protocol development)	<i>Aliciella cespitosa</i>	BLM Richfield – <u>Black Ridge area</u> for livestock impacts, motorized recreation impacts; <u>Fish Creek Cove area</u> for livestock, non-motorized recreation impacts; <u>Teasdale area</u> for non-motorized recreation impacts, collection activities; <u>Ant Hill area</u> for motorized and non-motorized recreation impacts	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
		FNF - <u>Fish Creek Cove area</u> for livestock, non-motorized recreation impacts; <u>Teasdale area</u> for motorized, non-motorized recreation impacts, collection activities; <u>Ant Hill area</u> for motorized and non-motorized recreation impacts	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
	<i>Aliciella tenuis</i>	BLM Price – <u>Last Chance area</u> for livestock, collection activities; <u>Seeger's Hole area</u> for motorized recreation impacts; <u>South Salt Wash area</u> for motorized and non-motorized recreation impacts; <u>Secret Mesa area</u> for motorized recreation impacts;	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
	<i>Astragalus harrisonii</i>	NPS CARE – <u>Fruita area</u> for non-motorized recreation impacts and collection activities; <u>Pleasant Creek area</u> for non-motorized recreation impacts;	\$2,000/yr for 10 yrs	FY07 thru FY17
	<i>Cymopterus beckii</i>	BLM Richfield – <u>Fish Creek Cove area</u> for livestock and non-motorized recreation impacts	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
		FNF – <u>Fish Creek Cove area</u> for livestock and non-motorized recreation impacts	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17
	<i>Erigeron maguirei</i>	BLM Price –potentially - <u>Coal Wash area</u> , <u>Secret Mesa area</u> , <u>Link Flats area</u> - for motorized and non-motorized recreation impacts. Include <u>Calf Canyon area</u> if population is determined to be extant.	\$2,000 for first yr, \$500/yr for 9 yrs	FY07 thru FY17

*Actions will be completed as funds become available and may not be completed in the years presented.

regulations. Field reconnaissance would be conducted to determine if any of the Navajo endemics or their habitat is present within a proposed action area. If the species are found, avoidance or mitigation measures would be enacted to ensure protection of occurrences.

The following specific actions were derived from the threats section above. This list does not include all potential activities authorized, funded, or carried out by the agencies that would consider the protection of the Navajo endemics and their habitat. See Table 7 for specific actions to be addressed by land management plans and regulations. These actions will help satisfy portions of objectives 4, 6, and 7.

Table 7. Specific actions addressed by land management plans and regulations.

Conservation Action	Species	Responsibility
Adjust surface disturbance locations to avoid Navajo endemics for Discretionary and Leasable Minerals	All Species	BLM and FNF
Avoid road building & improvement activities outside existing roadways where Navajo endemics are located	<i>Aliciella tenuis</i>	BLM Price – <u>Last Chance and Seger's Hole areas</u>
	<i>Aliciella cespitosa</i>	NPS CARE – <u>Fruita area</u>
	<i>Astragalus harrisonii</i>	NPS CARE – <u>Fruita area</u>
Avoid trail building & maintenance activities outside existing trails where Navajo endemics are located	<i>Aliciella cespitosa</i>	FNF – <u>Ant Hill area</u> NPS CARE – <u>Fruita area</u>
	<i>Astragalus harrisonii</i>	NPS CARE – <u>Fruita area</u>
	<i>Cymopterus beckii</i>	NPS CARE – <u>Fruita area</u>
Lands containing Navajo endemics will not be identified for disposal, exchange, etc.	All species	BLM and FNF
Work to acquire private and state lands that contain Navajo endemics	All species	All agencies

F. Protect Navajo endemics from commercial exploitation and illegal collection.

Identify illegal activities and inform appropriate law enforcement personnel when action is needed to enforce applicable regulations. Develop surveillance techniques to monitor at risk occurrences of these species. See Table 8 for protection actions from commercial exploitation and illegal collection.

Navajo endemics should be evaluated to determine whether any of these species meet the criteria for listing in Appendix I, II, or III of the Convention of International Trade in Endangered Species of Fauna and Flora (CITES). If any meet these criteria, they should be petitioned by the FWS for inclusion on this list. This action will help satisfy portions of objectives 4, 6, and 7.

Table 8. Protection actions from commercial exploitation and illegal collection.

Conservation Action	Species	Responsibility
List Navajo endemics in the Convention of International Trade in Endangered Species of Fauna and Flora	All Species	FWS
Implement surveillance at potential collection sites	<i>Aliciella cespitosa</i>	BLM Richfield
		NPS CARE
	<i>Erigeron maguirei</i>	BLM Price
		NPS CARE
Educate federal law enforcement staff in the Strategy area about these species	All species	All Agencies

G. Pursue funding for a Center for Plant Conservation Endowment for Navajo endemics.

Agencies would pursue funding to establish a Center for Plant Conservation (CPC) endowment for all the Navajo endemics except *Aliciella cespitosa*. The *Aliciella cespitosa* CPC is already fully funded and is being sponsored by the Denver Botanic Gardens. *Erigeron maguirei* is currently covered by the Flagstaff Arboretum for seed collection and storage only; however, it is not covered by a CPC endowment at this time. These endowments include seed collection, creation of seed storage banks, and establishment of germination and propagation trials for the purpose of maintaining genetic conservation. This also may include research into techniques necessary for establishing additional occurrences in suitable habitat. See Table 9 for actions needed for conservation endowments. This action will help satisfy portions of objectives 4, 7, and 9.

H. Develop public awareness, appreciation, and support for the conservation of Navajo endemics.

The agencies would develop new partnerships with non-governmental organizations, such as native plant societies, botanical gardens, and academic institutions, etc. and continue their educational programs to increase public awareness of these and other rare plant species. CARE will maintain its exhibit on rare plants in their Visitor Center and continue to distribute leaflets on rare plants in the area. See Table 10 for public awareness needs. This action will help satisfy portions of objectives 4 and 5.

I. Implement specific management actions to prevent loss of plants.

If monitoring determines threats are impacting plants, then specific management actions to reduce those threats need to be implemented. These actions would need to be monitored to determine their effectiveness. Specific actions known at this time include repairing and maintaining fences in Teasdale and Fish Creek Cove areas. See

Table 11 for specific actions to prevent loss of plants. This action will help satisfy portions of objectives 4, 5, and 8.

Table 9. Center for Plant Conservation endowments.

Conservation Action	Species	Responsibility	Estimated Cost*	Time Frame*
Coordination with Center for Plant Conservation	<i>Aliciella tenuis</i>	BLM Price NPS CARE	\$6,000 \$4,000	by FY17
	<i>Astragalus harrisonii</i>	NPS CARE	\$10,000	by FY17
	<i>Cymopterus beckii</i>	NPS CARE FNF BLM Richfield	\$2,500 \$5,000 \$2,500	by FY17
	<i>Erigeron maguirei</i>	NPS CARE FNF BLM Price	\$7,000 \$1,000 \$2,000	by FY17

*Actions will be completed as funds become available and may not be completed in the years presented.

Table 10. Public Awareness.

Conservation Action	Species	Responsibility	Estimated Cost*	Time Frame*
Develop Public Awareness brochures and programs	<i>Aliciella cespitosa</i>	NPS CARE	\$500	FY10/FY11
		FWS	\$500	FY10/FY11
		FNF	\$500	FY10/FY11
		BLM Richfield	\$500	FY10/FY11
	<i>Aliciella tenuis</i>	NPS CARE	\$500	FY10/FY11
		FWS	\$500	FY10/FY11
		BLM Price	\$500	FY10/FY11
	<i>Astragalus harrisonii</i>	NPS CARE	\$500	FY10/FY11
		FWS	\$500	FY10/FY11
	<i>Cymopterus beckii</i>	NPS CARE	\$500	FY10/FY11
		FWS	\$500	FY10/FY11
		FNF	\$500	FY10/FY11
		BLM Richfield	\$500	FY10/FY11
	<i>Erigeron maguirei</i>	NPS CARE	\$500	FY10/FY11
		FWS	\$500	FY10/FY11
		FNF	\$500	FY10/FY11
		BLM Price	\$500	FY10/FY11

*Actions will be completed as funds become available and may not be completed in the years presented.

Table 11. Specific actions to prevent loss of plants.

Conservation Action	Species	Responsibility	Estimated Cost*	Time Frame*
Maintain Existing Fences	<i>Aliciella cespitosa</i>	BLM Richfield – <u>Fish Creek Cove area</u> repair and maintain fence on agency boundary at access point into Fish Creek Cove; <u>Teasdale area</u> maintain fence along road restricting access into site, complete fence along agency/ private boundary	\$1,000/yr every 3 yrs	FY07 thru FY17
		FNF – <u>Fish Creek Cove area</u> repair and maintain fence on agency boundary at access point into Fish Creek Cove	\$500/yr every 3 yrs	FY07 thru FY17

*Actions will be completed as funds become available and may not be completed in the years presented.

Table 12. Total cost estimate for full implementation of this Strategy over the ten year time frame, by species, by agency. Monetary values do not denote agency priority. N/A means that either the species is not known to occur or does not occur in significant numbers on lands within that agency's jurisdiction.

	BLM Richfield	BLM Price	FNF	NPS CARE	FWS
Species					
<i>Aliciella cespitosa</i>	20,500	N/A	25,500	11,000	500
<i>Aliciella tenuis</i>	N/A	46,000	2,000	33,500	500
<i>Astragalus harrisonii</i>	N/A	N/A	N/A	84,000	500
<i>Cymopterus beckii</i>	9,500	N/A	29,000	17,500	500
<i>Erigeron maguirei</i>	N/A	24,000	8,000	18,500	500
Subtotal of costs	30,000	70,000	64,500	164,500	2,500
Database maintenance and report writing	10,000	24,000	21,500	55,000	1,000
Total cost estimate over 10 years	\$40,000*	\$94,000*	\$86,000*	\$219,500*	\$3,500*

*Actions will be completed as funds become available.

Appendix A. Potential threats to each Navajo endemic species by area and management agency. (Abundance definitions are: small < 10% of total numbers; moderate > 10% and < 25%; and large >25%.

Aliciella cespitosa

Areas by Agency	Black Ridge - BLM	Ant Hill – FNF/BLM	Deep Creek - CARE	Fruita – CARE	Fish Creek Cove – BLM/DNF**	Teasdale - BLM/DNF**
Abundance within Area	small number of plants known	large number of plants known	large number of plants known	small number of plants known	Largest number of plants known	moderate number of plants known
THREATS						
Motorized Recreational Use	road nearby, access restricted; designated OHV trail adjacent to area	illegal motorcycle use on pack trail; designated OHV trail adjacent to area	closed to motor vehicle use	closed to motor vehicle use	open to OHV use, but not actively used to date; deteriorating fence restricts access	open to OHV use, but not actively used to date; area fenced to restrict access
Non-Motorized Recreational Use	low use to date	pack trail through one site	very remote area; very rarely visited	a few plants close to trails, but majority of plants away from trails	hiking and cattle trail within area	moderate potential for impacts due to adjacent private development
Road Building and Maintenance	no roads proposed or maintained in the area	no roads proposed or maintained in the area	no roads proposed or maintained in the area	no impacts from road maintenance	no roads proposed or maintained in the area	no roads proposed or maintained in the area
Trail Building and Maintenance	no trails proposed or maintained in the area	moderate to high potential for impact from maintenance of pack trail, one site	no trails proposed or maintained in the area	low potential for impact along Rim Overlook Trail	no trails proposed or maintained in the area	no trails proposed or maintained in the area
Oil and Gas, Mining, Sand, and Gravel Quarrying exploration and development	open to oil and gas leasing, standard conditions, low potential; low potential for locatable minerals	open to oil and gas leasing, standard conditions, low potential; low potential for locatable minerals	withdrawn from all mineral exploration and development	withdrawn from all mineral exploration and development	open to oil and gas leasing subject to constraints (seasonal restrictions), low potential; low potential for locatable minerals	open to oil and gas leasing subject to constraints (seasonal restrictions), low potential; low potential for locatable minerals
Pesticide Use	no impact	no impact	no impact	no impact	no impact	no impact
Collection	low potential for impact	low potential	low potential	moderate potential	high potential	known collection site; high potential

Aliciella cespitosa

Areas by Agency	Black Ridge - BLM	Ant Hill – FNF/BLM	Deep Creek - CARE	Fruita – CARE	Fish Creek Cove – BLM/DNF**	Teasdale - BLM/DNF**
Threats						
Livestock Use	<u>BLM -Government Creek cattle Allotment</u> receives seasonal use from 12/1 through 2/28 with 91 AUM's. Some plants accessible to trampling by livestock.	<u>FNF - Thousand Lake– Sulfur Unit cattle allotment</u> managed by a three-pasture rest rotation system; early (6/1 to 8/15), late (8/15 to 10/15), or rested each year. <u>BLM -Bicknell cattle/sheep allotment</u> receives seasonal use from 11/1 to 1/18 with 58 cattle AUM's and 32 sheep AUM's. Low potential of threat.	Some plants in <u>Hartnet cattle allotment</u> in CARE, but are inaccessible to cattle.	not within an allotment.	<u>BLM - Spring Branch Horse Allotment</u> receives seasonal use from November 10 through April 15 with 11 AUM's. This BLM allotment has not been used for several years. <u>DNF - North Slope cattle allotment</u> receives seasonal use between 6/6 and 10/9 with 275 AUM's. Some plants accessible to trampling by livestock. Currently unused.	<u>BLM - Horse Pasture cattle allotment</u> has 14 AUM's with seasonal use in November only. <u>DNF -North Slope cattle allotment</u> receives seasonal use between 6/6 and 10/9 with 275 AUM's. Currently unused.
Land Exchange	potential for land exchange	unlikely for land exchange	not subject to land exchange	not subject to land exchange	potential for land exchange	potential for land exchange

** Lands within the area of this Conservation Agreement and Strategy on Dixie National Forest are administered by Fishlake National Forest.

Aliciella tenuis

Areas by Agency	Last Chance – BLM/SATE	South Desert - CARE	S. Salt Wash – BLM/STATE	Segers Hole – BLM/STATE	Johns Hole - BLM	Muddy Creek – BLM	Secret Mesa - BLM
Abundance within Area	large number of plants known	large number of plants known	large number of plants known	small number of plants known	small number of plants known	small number of plants known	small number of plants known
Threats							
Motorized Recreational Use	low potential impacts from OHV	closed to motor vehicle use	Illegal OHV impacts occurring at one site; moderate to high potential for OHV impacts at this site	moderate potential impacts from OHV	area closed to OHV traffic	low potential impacts from OHV	low potential OHV impact; Eva Conover ATV trail through area, but use is restricted to established trail and plants not adjacent to trail
Non-Motorized Recreational Use	low current impacts	non-motorized use of area extremely low	potential for moderate impacts; dispersed camping throughout area	high potential; camp area near one site	non-motorized use of area extremely low	low potential for impacts; published hiking route adjacent to one site	moderate potential for impacts; area used by recreationists
Road Building and Maintenance	moderate potential for road improvement impacts on Last Chance Road	no maintained or proposed roads in area	moderate potential for road improvement impacts at one site	old abandoned road goes through site; if maintained or upgraded would directly impact plants	no maintained or proposed roads in area	no maintained or proposed roads in area	no maintained or proposed roads in area
Trail Building and Maintenance	no maintained or proposed trails in area	no maintained or proposed trails in area	no maintained or proposed trails in area	no maintained or proposed trails in area	no maintained or proposed trails in area	no maintained or proposed trails in area	Eva Conover ATV trail through area; low potential for impact

Aliciella tenuis

Areas by Agency	Last Chance – BLM/STATE	South Desert - CARE	S. Salt Wash – BLM/STATE	Segers Hole – BLM/STATE	Johns Hole - BLM	Muddy Creek – BLM	Secret Mesa - BLM
Threats							
Oil and Gas, Mining, Sand, and Gravel Quarrying exploration and development	open to oil and gas leasing, low potential; low potential for locatable minerals; area adjacent to existing gypsum mine a high potential area for gypsum mining	withdrawn from all mineral exploration and development	open to oil and gas leasing, low potential; low potential for locatable minerals; area near an existing gypsum mine, sites adjacent to a high potential area for gypsum mining	open to oil and gas leasing, low potential; low potential for locatable minerals; sites adjacent to a high potential area for gypsum mining	open to oil and gas leasing, low potential; low potential for locatable minerals; sites adjacent to a high potential area for gypsum mining	open to oil and gas leasing, low potential; low potential for locatable minerals; area close to existing gypsum mine, sites adjacent to a potential area for gypsum mining	open to oil and gas leasing, low potential; low potential for locatable minerals; area near an existing gypsum mine, sites adjacent to a high potential area for gypsum mining
Pesticide Use	no impact	no impact	no impact	no impact	no impact	no impact	no impact
Collection	plants easily accessible; type locality collections made	area not known to public	plants easily accessible; collection not known to date	plants easily accessible; collection not known to date	area not known to public	plants accessible; collection not known to date	plants accessible; collection not known to date
Livestock Use	BLM - <u>Mussentuchit cattle allotment</u> receives seasonal use from 10/15 to 5/31, with 1,998 AUM's. Some plants could be trampled	Some plants in <u>Hartnet cattle allotment</u> ; but are inaccessible to livestock	BLM - <u>Mussentuchit and BLM – Lone Tree cattle allotments</u> ; plants inaccessible to livestock	BLM – <u>Hondo and Rock Springs cattle allotments</u> ; plants inaccessible to livestock	BLM – <u>Hondo cattle allotment</u> ; plants inaccessible to livestock	BLM – <u>Lone Tree cattle allotment</u> ; plants inaccessible to livestock	BLM – <u>Coal Wash cattle allotment</u> ; plants inaccessible to livestock
Land exchange	contains State land	not subject to land exchange	contains State land	contains State land	not subject to land exchange	not subject to land exchange	not subject to land exchange

Astragalus harrisonii

Areas by Agency	Fruita - CARE	Pleasant Creek - CARE
Abundance within Area	large number of plants known	large number of plants known
Threats		
Motorized Recreational Use	closed to OHV recreational use	closed to OHV recreational use
Non-Motorized Recreational Use	found along four trails	found along one route
Road Building and Maintenance	high potential for impact along the two roads	no potential for impact
Trail Building and Maintenance	high potential for impact along four trails	no potential for impact
Oil and Gas, Mining, Sand, and Gravel Quarrying exploration and development	withdrawn from all mineral exploration and development	withdrawn from all mineral exploration and development
Pesticide Use	no impact	no impact
Collection	high potential; several plants collected from this area illegally in the past	low potential for collection
Livestock Use	not within an allotment	not within an allotment; cattle trailing through one site has low potential for impact
Land Exchange	not subject to land exchange	not subject to land exchange

Cymopterus beckii

Areas by Agency	Fish Creek Cove – BLM/DNF**	Sand Flat – FNF	Deep Creek - CARE	Fruita – CARE	Pleasant Creek - CARE	Onion Beds – CARE
Abundance within Area	small number of plants known	Largest number of plants known	small number of plants known	moderate number of plants known	moderate number of plants known	moderate number of plants known
Threats						
Motorized Recreational Use	open to OHV use, but not actively used to date	area closed to motorized vehicle use	area closed to motorized vehicle use	area closed to motorized vehicle use	area closed to motorized vehicle use	area closed to motorized vehicle use
Non-Motorized Recreational Use	hiking and cattle trail adjacent to area, low to moderate potential for impacts	hiking trail through area, low potential for impacts	low potential for impacts; non-motorized use extremely low in area	low potential for impacts; few plants along routes	low potential for impacts; few plants along routes	no potential for impacts; non-motorized access extremely difficult
Road Building and Maintenance	no roads proposed or maintained in this area	no roads proposed or maintained in this area	no roads proposed or maintained in this area	no roads proposed or maintained in this area	no roads proposed or maintained in this area	no roads proposed or maintained in this area
Trail Building and Maintenance	no trails proposed or maintained in this area	no trails proposed or maintained in this area	no trails proposed or maintained in this area	low potential for impacts due to trail maintenance	no trails proposed or maintained in this area	no trails proposed or maintained in this area
Oil and Gas, Mining, Sand, and Gravel Quarrying exploration and development	open to oil and gas leasing subject to constraints (seasonal restrictions) low potential; low potential for locatable minerals	open to oil and gas leasing subject to constraints (seasonal restrictions) low potential; low potential for locatable minerals	withdrawn from all mineral exploration and development	withdrawn from all mineral exploration and development	withdrawn from all mineral exploration and development	withdrawn from all mineral exploration and development
Pesticide Use	no impact	no impact	no impact	no impact	no impact	no impact
Collection	low potential for collection, easy access, not known to date	low potential for collection, not known to date	extremely low potential for collection, not known to date	low potential for collection, easy access, not known to date	low potential for collection, not known to date	extremely low potential for collection, not known to date

Cymopterus beckii

Areas by Agency	Fish Creek Cove – BLM/DNF**	Sand Flat – FNF	Deep Creek - CARE	Fruita – CARE	Pleasant Creek - CARE	Onion Beds – CARE
Threats						
Livestock Use	<u>BLM - Spring Branch Horse Allotment</u> receives seasonal use from 11/10 through 4/15 with 11 AUM's; <u>DNF –North Slope cattle allotment</u> receives seasonal use between 6/6 and 10/9 with 275 AUM's. Some plants accessible to trampling by livestock. Currently unused.	<u>FNF - Thousand Lake cattle allotment</u> ; plants inaccessible to livestock	<u>Hartnet cattle allotment</u> ; plants inaccessible to livestock	not within an allotment	not within an allotment	not within an allotment
Land Exchange	potential for land exchange	not likely for land exchange	not subject to land exchange	not subject to land exchange	not subject to land exchange	not subject to land exchange

** Lands within the area of this Conservation Agreement and Strategy on Dixie National Forest are administered by Fishlake National Forest.

Erigeron maguirei

Areas by Agency	Calf Canyon – BLM/ STATE	Coal Wash – BLM	Secret Mesa – BLM	Link Flats – BLM	Johns Hole – BLM	Segers Hole – BLM	Deep Creek – CARE	Capitol Reef – CARE	Waterpocket Fold – CARE
Abundance within Area	small number of plants known; area not visited for over 15 years	small number of plants known	moderate number of plants known	small number of plants known	small number of plants known	small number of plants known	Largest known number of plants known	moderate number of plants known	moderate number of plants known
Threats									
Motorized Recreational Use	open to OHV use, no impacts known	low potential; Eva Conover ATV trail through area	low potential; Eva Conover ATV trail through area	low potential; ATV trails through area	closed to motorized vehicle use	low potential at one site	closed to motorized vehicle use	closed to motorized vehicle use	closed to motorized vehicle use
Non-Motorized Recreational Use	low current impacts	low potential for impacts	low potential for impacts	low potential for impacts	low potential for impacts	high potential; camp area near one site	non-motorized use of area extremely low	low potential for impacts	low potential for impacts
Road Building and Maintenance	no roads proposed or maintained in this area	no roads proposed or maintained in this area	no roads proposed or maintained in this area	no roads proposed or maintained in this area	no roads proposed or maintained in this area	no roads proposed or maintained in this area	no roads proposed or maintained in this area	low potential for impact	no roads proposed or maintained in this area
Trail Building and Maintenance	no trails proposed or maintained in this area	Eva Conover ATV trail through area; low potential for impact	Eva Conover ATV trail through area; low potential for impact	no trails proposed or maintained in this area	no trails proposed or maintained in this area	no trails proposed or maintained in this area	no trails proposed or maintained in this area	low potential for impact	low potential for impact

Erigeron maguirei

Areas by Agency	Calf Canyon – BLM/ STATE	Coal Wash – BLM	Secret Mesa – BLM/ STATE	Link Flats – BLM/ STATE	Johns Hole – BLM	Segers Hole – BLM/ STATE	Deep Creek – CARE	Capitol Reef – CARE	Waterpocket Fold – CARE
Threats									
Oil and Gas, Mining, Sand, and Gravel Quarrying exploration and development	open to oil and gas leasing, low potential; low potential for locatable minerals; partially in a medium potential area for gypsum mining	open to oil and gas leasing, low potential; low potential for locatable minerals; partially in a high potential area for gypsum mining	open to oil and gas leasing, low potential; low potential for locatable minerals; adjacent to high potential area for gypsum mining and existing gypsum mine	open to oil and gas leasing, low potential; low potential for locatable minerals; adjacent to a high potential area for gypsum mining	open to oil and gas leasing, low potential; low potential for locatable minerals; partially in a high potential area for gypsum mining	open to oil and gas leasing, low potential; low potential for locatable minerals	withdrawn from all mineral exploration and development	withdrawn from all mineral exploration and development	withdrawn from all mineral exploration and development
Pesticide Use	no impact	no impact	no impact	no impact	no impact	no impact	no impact	no impact	no impact
Collection	low potential, not known to date	low potential, not known to date	low potential, not known to date	low potential, not known to date	low potential, not known to date	low potential, not known to date	low potential, not known to date	low potential, not known to date	low potential, not known to date
Livestock Use	<u>BLM – Calf Canyon cattle allotment</u> ; plants inaccessible to cattle	<u>BLM- Coal Wash cattle allotment</u> ; plants inaccessible to cattle	<u>BLM- Coal Wash and Wood Hollow cattle allotments</u> ; plants inaccessible to cattle	<u>BLM – Globe Links cattle allotment</u> ; plants inaccessible to cattle	<u>BLM – Hondo cattle allotment</u> ; plants inaccessible to livestock	<u>BLM – Hondo cattle allotment</u> ; plants inaccessible to livestock	<u>Hartnet cattle allotment</u> ; plants inaccessible to cattle	not within an allotment	cattle trailing through one site could impact plants
Land Exchange	contains State land	unlikely for exchange	contains State land	contains State land	unlikely for exchange	contains State land	not subject to exchange	not subject to exchange	not subject to exchange

Appendix B. List of Grazing Allotments by Agency that contain areas of the Navajo endemics. 'X' denotes presence of species within individual allotments.

Grazing Allotments	<i>Aliciella tenuis</i>	<i>Aliciella cespitosa</i>	<i>Astragalus harrisonii</i>*	<i>Cymopterus beckii</i>	<i>Erigeron maguirei</i>
BLM - Coal Wash	x				x
BLM - Lone Tree	x				
BLM - Hondo	x				x
BLM - Mussentuchit	x				
BLM - Last Chance	x				
BLM - Rock Springs	x				x
BLM – Calf Canyon					x
BLM – Wood Hollow					x
BLM – Globe Link					x
BLM – Government Creek		x			
BLM – Spring Branch		x		x	
BLM – Horse Pasture		x			
CARE -Hartnet	x	x		x	x
CARE – Sandy III					x
FNF -Thousand Lake; Sulfur Unit		x		x	x
FNF -Thousand Lake; Polk Creek Unit					x
DNF- North Slope		x		x	

* This species is not located within any grazing allotment.

Appendix C. Central Utah Navajo Sandstone Endemics Interagency Technical Team.

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