



FINAL REPORT
ON
HABITAT INVENTORY OF CANDIDATE PLANT SPECIES
IN THE WARM SPRINGS AND HOUSE RANGE RESOURCE AREAS

Prepared For:

BUREAU OF LAND MANAGEMENT
RICHFIELD DISTRICT OFFICE
150 EAST 900 NORTH
RICHFIELD, UTAH 84701
SOLICITATION UT910-RFP1-001

Prepared By:

RONALD J. KASS
ENVIRONMENTAL CONSULTING
270 EAST 1230 NORTH
SPRINGVILLE, UTAH 84663
(801) 489-3345

MARCH 21, 1992

BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

ID 88046850

OK
189
K377
1992

FINAL REPORT
ON
HABITAT INVENTORY OF CANDIDATE PLANT SPECIES
IN THE WARM SPRINGS AND HOUSE RANGE RESOURCE AREAS

Prepared For:

BUREAU OF LAND MANAGEMENT
RICHFIELD DISTRICT OFFICE
150 EAST 900 NORTH
RICHFIELD, UTAH 84701
SOLICITATION UT910-RFP1-001

Prepared By:

RONALD J. KASS
ENVIRONMENTAL CONSULTING
270 EAST 1230 NORTH
SPRINGVILLE, UTAH 84663
(801) 489-3345

MARCH 21, 1992

BLM LIBRARY
RS 150A BLDG 300
DENVER FEDERAL CENTER
P.O. BOX 22047
DENVER, CO 80225



ABSTRACT

Under solicitation UT910-RFP1-001, a habitat inventory for candidate plant species (category 2) was conducted in the Warm Springs and House Range Resource Areas, Bureau of Land Management, Richfield District Office.

The study area includes approximately 2,000,000 acres of land in Millard and Juab counties, Utah. Also located within the study area are 8 Wilderness Study Areas (WSA), comprising 394,000 acres. A literature and herbarium search was conducted in April 1991, and the field search was conducted in May, June, August and September 1991.

Field inventory results are as follows: 3 occurrences of Cryptantha compacta in 3 sections, 4 occurrences of Draba kassii in 4 sections, 10 occurrences of Eriogonum ammophilum in 10 sections, 6 occurrences of Penstemon concinnus in 6 sections, and 8 occurrences of Sphaeralcea caespitosa in 8 sections.

We did not find any new locations of Astragalus uncialis, Cuscuta warneri, Epilobium nevadense, Frasera gypsicola, Haplopappus crispus, Jamesia tetrapetala, Penstemon angustifolia var. dulcis, Primula domensis, and Trifolium andersonii var. friscanum.

Recommendations for species management, changes in listing status, threats, and species requiring additional study are discussed.



INTRODUCTION

Justification and Scope

The Endangered Species Act of 1973 (Section 2) declares that all federal departments and agencies shall seek to conserve endangered and threatened species and utilize their authorities in upholding the purposes of the Act. Section 7 of the Act mandates programs for conserving listed species, ensuring continued existence of listed species, preserving essential habitat, and ensuring adequate cooperation and assistance in conservation efforts.

It is Bureau of Land Management (BLM) policy to plan and implement programs for the conservation of threatened, endangered, and candidate plant species that occur on public land. In Utah the majority of candidate (category 2) plant species located on BLM lands are not well known. Therefore, in order to collect baseline inventory data, the BLM Richfield District Office contracted (J910-RFP1-001) a habitat inventory of candidate plant species in the Warm Springs and House Range Resource Areas in Juab and Millard Counties, Utah.

The following species were included in this inventory: Astragalus uncialis, Cryptantha compacta, Cuscuta warneri, Draba kassii, Epilobium nevadense, Eriogonum ammophilum, Frasera gypsicola, Haplopappus crispus, Penstemon angustifolius var. dulcis, Penstemon concinnus, Primula domensis, Sphaeralcea caespitosa, and Trifolium andersonii var. friscanum.



Study Area

The study area is located in western Utah in Juab and Millard counties and includes approximately 2,000,000 acres of BLM-administered land in the Richfield District (House Range and Warm Springs Resource Areas). The study area boundaries for this project were: northern boundary--Juab, Tooele County line, eastern boundary--arbitrary boundary at approximately 113° 15' longitude, southern boundary--Beaver County line, western boundary--Utah-Nevada border. U.S. Highway 6-50 transects at approximately the study area center in an east-west direction (Figure 1).

The study area elevation ranges between 3684 m (12,087 ft) at Ibabah Peak, in the Deep Creek Mountains, and 1400 m (4606 ft) near the eastern boundary at Sevier Dry Lake. Mean annual temperature range in Milford, Utah, is 3-21 degrees C (36-70 degrees F), and mean annual precipitation is 13.2 cm (5.2 ins). Mean annual temperature range in Delta, Utah, is 0-17 degrees C (31-61 degrees F), and mean annual precipitation is 17 cm (6.7 ins) (Eubank 1979).

The study area is popular for recreation because of the system of graded roads, numerous historical sites (Pony Express Trail), and geologic attractions (House Range trilobites, Crystal Peak, Fossil Mountain, and numerous rock-hounding areas). Eight Wilderness Study Areas (WSAs) are located in the study area. These WSAs include approximately 394,000 acres and are as follows: Deep Creek



Study Area

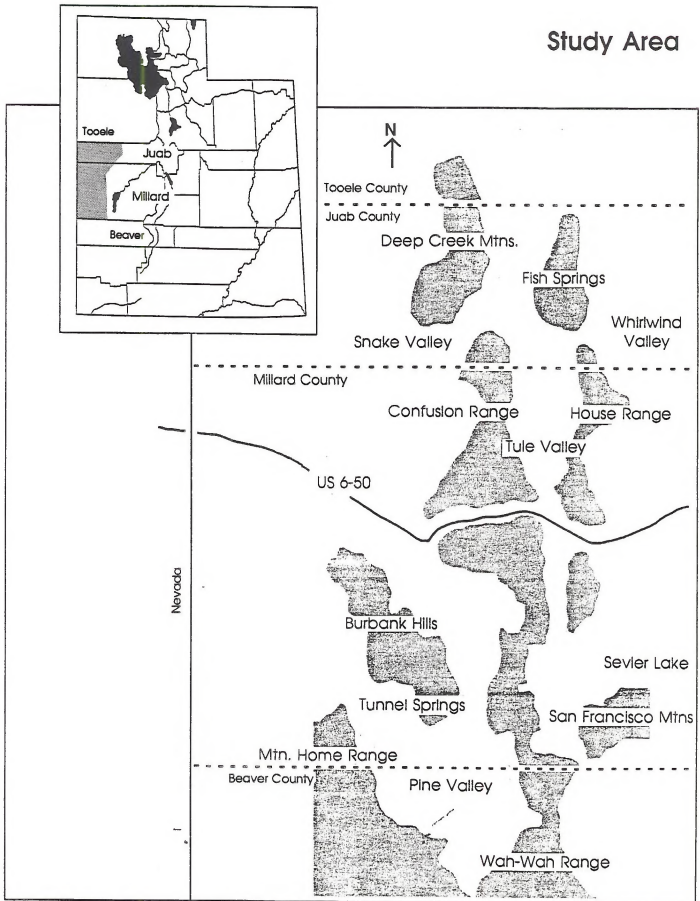
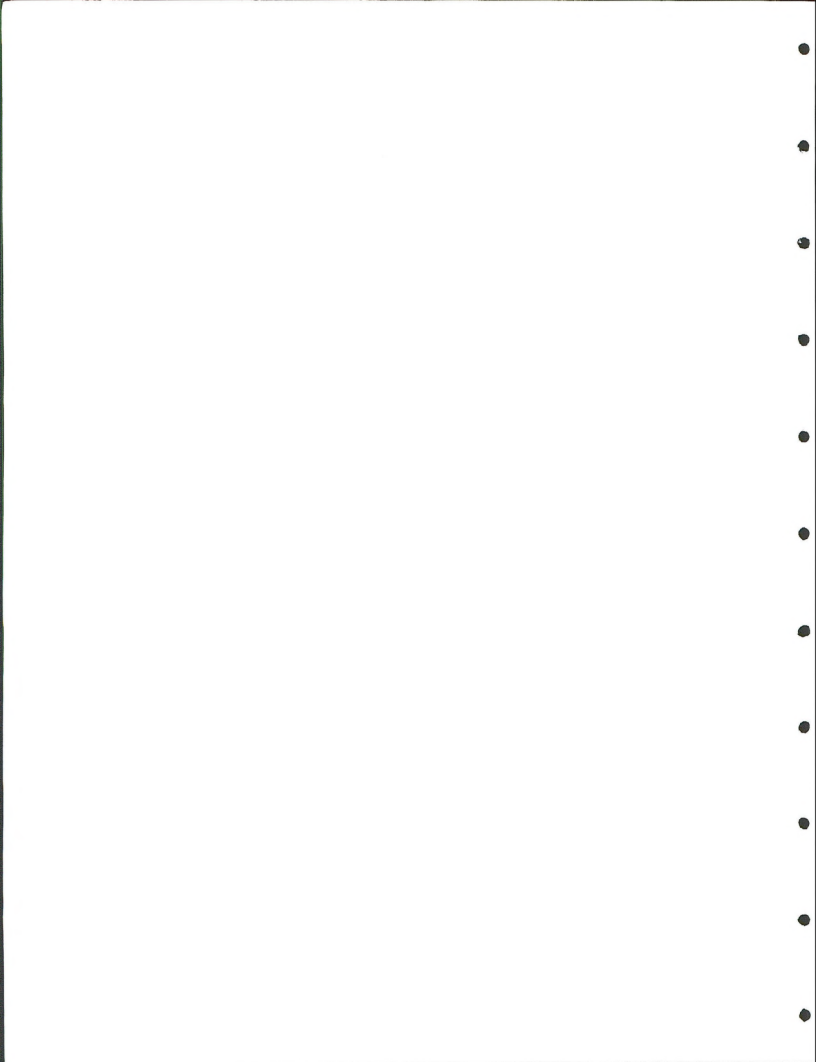


Fig. 1 - Map of study area



Mountains, Fish Springs, Swasey Mountain, Howell Peak, Conger Mountain, Notch Peak, King Top, and Wah-Wah Mountain (BLM 1990).

The study area is relatively uninhabited by human settlements, its principal land use being livestock grazing in winter and spring, and mineral exploration and recreation during summer and fall (BLM 1986). Gold exploration has recently increased in the Deep Creek and Confusion ranges and could be a potential source of employment and income.

METHODS

Literature/Herbarium Search

A literature search of the target taxa was conducted at Brigham Young University Herbarium as part of Task 1. A comprehensive computer search was also conducted at the Utah State Heritage Program in Salt Lake City (Peterson 1991). The following information is provided in the Inventory Findings section for each taxa:

Scientific Name
Common Name
Family
USFWS Status
Original Citation
Synonyms
Taxonomic Discussion
Historic Distribution
Habitat Characteristics

Additional information sources such as monographs, USFW status reports, taxonomic and ecological journals, and various rare plant inventory contract reports were also utilized.



Potential inventory areas were selected based on the following criteria: if potential inventory areas shared similar geology and habitat characteristics (edaphics, elevation), these unsurveyed areas were chosen as high-priority search areas. Other unsurveyed areas (i.e., similar geology but dissimilar habitat or edaphics) were considered secondary inventory areas and searched after priority areas received a thorough, systematic search.

Results of Task 1 literature and herbarium search were submitted on d-Base III+ to the Richfield District Office on a floppy disk. Historic locations were collected and mapped on 1:100,000 BLM surface management status maps. Historic locations are included (smaller dots) with new locations (larger dots) on the 1:100,000 maps. The 1:100,000 maps and 7.5 USGS quadrangles will be submitted as part of the final report.

Reconnaissance

Three days of reconnaissance was conducted May 14-16. When possible, inventory members visited the type locality of each target taxon and reviewed geology, habitat features, and diagnostic plant characteristics. Mapping, photography, and data-recording techniques were refined for consistency during field inventory.

A meeting with the COR (Contracting Officer) and COAR (Contracting Officer Assistant) was held April 15, 1990, and inventory procedures and possible changes in scheduling were discussed. In agreement with the COR and COAR, relatively small amounts of time were devoted to exhaustive censusing of newly



discovered populations. Field inventory was devoted to finding as many new locations of the target taxa as possible.

Also in agreement with the COR and COAR, minimal time was spent in the eight WSAs because of restricted access and the protection status given these areas. If a target species had potential of occurring in WSA, we devoted the time necessary to complete the field search. Task 2 (field inventory) began May 17 after completion of the reconnaissance period.

Field Inventory

Ronald J. Kass (project leader), and Geoff Carpenter were the field inventory members. Each member worked alone using his own vehicle. Inventory members were constantly alert for unique habitats or geologic substrates capable of supporting target taxa, or new or highly variable taxa. When potential habitat was located, a foot search was conducted until the inventory members were reasonably assured of that no target taxa occurred.

After a new population was located, inventory members spent approximately 1 hour recording data, searching for additional individuals, and obtaining a voucher collection. A photograph was taken of the plant in its habitat, with township, range, and section (if possible, quarter, quarter section) were noted. In addition, a population habitat data form was completed for each new population. These data, in respect to spatial area of the population, number of individuals, and viability of the population, are often subjective estimates. Precise data is usually given for location, habitat, and species abundance (Neese 1987).



Search intensity was plotted on a 1:100,000 land status map to document negative as well as positive findings and to insure systematic coverage of the area. Search efforts were color-coded: pink (low-intensity search; drive vehicle slowly through search area), green (medium-intensity foot search for 15-20 minutes), and blue (high-intensity foot search for 1 hour or longer).

In some cases, reporting information on the population habitat data forms was difficult. For example, "population area" was often difficult to estimate because of the limited time spent at each newly located taxon. Several days might be required to accurately estimate the population area. Also, age class is often difficult to estimate unless the observer follows the development of individuals on a yearly basis. Inventory members often recorded "uncertain" in those categories on the population habitat data forms.

Following completion of a field day, inventory members plotted results on 7.5 USGS quads and 1:100,000 BLM land status maps, checked data sheets for accuracy, pressed plant specimens, and discussed pertinent information and plans for the next day with the project leader.

A general botanical collection was deposited at Brigham Young University Herbarium. Nomenclature followed Welsh et al. (1987). Collecting permits were obtained from the U.S. Fish and Wildlife Service (USFWS), and all plant collecting was conducted in accordance with USFWS guidelines. If population density was low,



(i.e., 1-10 individuals) inventory members did not collect a voucher specimen.

DISCUSSION

Floristics, Geology, and Ecology

Floristics

The study area occurs within the Calcareous Mountains and Bonneville Basin Sections of the Great Basin Floristic Division. Most of the study area is in the Bonneville Section except for the Wah-Wah Mountains and the Burbank Hills, which belong to the Calcareous Mountain Section (Cronquist et al. 1972). This area, which contained Pleistocene Lake Bonneville, is characterized by moderately high elevation mountain ranges separated by broad, saline basins. Throughout the area, events of the geologic past has influenced the present day flora.

The modern-day flora of the Great Basin had its origins during the Pleistocene period. Desert genera such as Artemisia, Atriplex, Ephedra, and numerous grasses and herbs probably entered North America across the Bering Strait. These genera were preadapted to establishment in saline and alkaline conditions created by the drying of Lake Bonneville (Reveal 1979). Past geologic events coupled with low amounts of precipitation and warmer temperature favored the development and dominance of these genera. Kass (1988) found the following families comprising 40% of the House Range flora: Asteraceae, Poaceae, Brassicaceae,



Fabaceae, and Chenopodiaceae. Approximately 13% of the flora was adventive species originating from Eurasia.

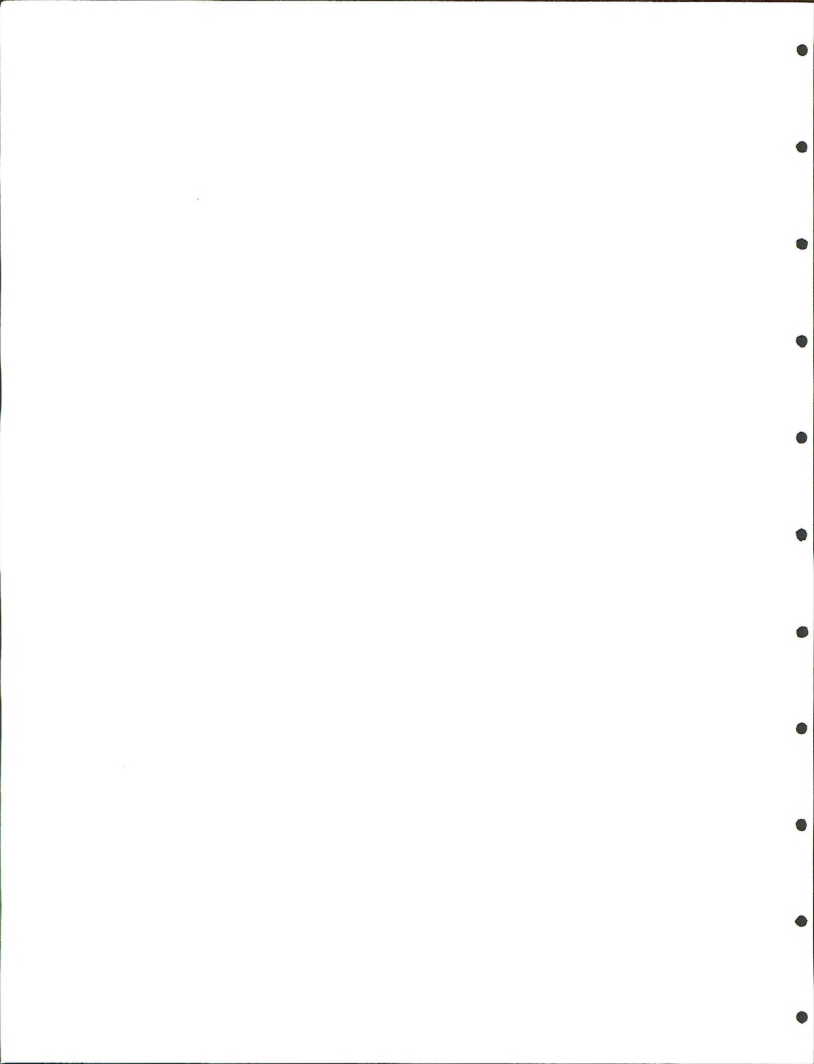
In arid regions edaphic specialization is an important process leading to divergence of taxa and speciation. The biology of rare taxa is that of restricted local endemics distributed non-randomly.

Welsh (1979) compared endemism across phytogeographic subdivisions and found the Great Basin to support approximately 35 species of a total of 239, which represents about 15% of the endemic flora. Only the Navajo Basin (27%) and Utah Plateaus (20%) had more endemic taxa. Reveal (1979) suggests the Great Basin would be comparable to the Navajo Basin in endemic species if it had not experienced extreme environmental conditions and subsequent Pleistocene extinctions.

Geology and Physiography

The study area was part of a large Paleozoic sea that deposited vast amounts of sediments over the Intermountain Area (Hintze 1988). Cambrian, Ordovician, and Silurian limestones and dolomites are the dominant parent material of most mountain ranges in the study area. Igneous activity occurred during the Tertiary period evidenced by the many uplifted igneous deposits found in the southern portions of the study area. Both the Mountain Home and San Francisco ranges are uplifted igneous deposits (Hintze 1988).

Miocene block-faulting produced most of the present-day Basin and Range structures. These ranges are characterized by a series of north-south-trending ranges separated by narrow saline valleys.



Relief is generally steep on the western side and gently sloping on the eastern side.

Quaternary sediments, deposited as alluvial fans and valley fill, have been partly reworked or covered by the action of Lake Bonneville (Hanks 1962). Recent aeolian deposits are found throughout the study area, especially in Tule Valley and the Ferguson Desert.

Plant Associations

The study area is represented by the following four vegetation associations as described by Kass (1988): salt desert shrub zone, sagebrush zone, pinyon-juniper zone, mountain brush and subalpine zone.

Salt Desert Shrub

This association is dominated by low, widely spaced shrubs, principally of the Chenopodiaceae and Asteraceae. Its elevation ranges between 1320 m (4330 ft) and 1690 m (5544 ft). Annual precipitation is approximately 15.2 cm (6 inches).

Shadscale (Atriplex confertifolia) is the dominant shrub and covers vast areas on the valley floors and upper benches created by Pleistocene Lake Bonneville. Principal shrubby species include budsage (Artemisia spinescens), Mormon tea (Ephedra nevadensis), green molly (Kochia americana), spiny hopsage (Grayia spinosa) and winterfat (Ceratoides lanata). Greasewood (Sarcobatus vermiculatus) is widespread in the valley bottoms and around playa margins.



Principal grass species include galleta (Hilaria jamesii), Indian ricegrass (Stipa hymenoides), and Sandberg bluegrass (Poa secunda).

Sagebrush

Sagebrush is widely distributed both elevationally and latitudinally throughout the study area. Its elevation ranges from 1690 m (5545 ft) to nearly 2940 m (9646 ft). Annual precipitation is estimated at 17.8 cm (7 inches) in the lower elevations and 46.0 cm (18 inches) at higher elevations. Five specialized taxa of sagebrush are recognized in the study area. Black sage (Artemisia nova) is characteristic of upland desert shrub associations. It is often codominant with shadscale and occurs in pure stands within and above the pinyon-juniper zone. Low sagebrush (Artemisia arbuscula) occurs on shallow, rocky soils on windswept ridges in and above the pinyon-juniper zone. Basin big sagebrush (Artemisia tridentata var. tridentata) occurs on dry, deep, alluvial soils in valleys and washes at middle elevations at 2135 m (7000 ft). Mountain big sagebrush (Artemisia tridentata var. vaseyana) occurs in well-drained soils above 2135 m (7000 ft), and Wyoming big sagebrush (Artemisia tridentata var. wyomingensis) occurs on alluvial fans and valley bottoms.

Pinyon-juniper

Single-leaf pinyon (Pinus monophylla) and juniper (Juniperus osteosperma) are codominant in the intermediate elevations ranging from 1983 to 2288 m (6500 to 7500 ft). The composition of this



woodland changes altitudinally, with juniper dominating in the lower elevations 1675 m (5500 ft) and pinyon dominating at higher elevations 2438 m (8000 ft). West et al. (1978) report variation in Basin-wide elevational limits of this woodland. This woodland develops in areas where annual precipitation exceeds 30 cm (12 inches).

Herbaceous species commonly occurring in this association include dwarf lousewart (Pedicularis centranthera), low phlox (Phlox austromontana), ball gilia (Gilia congesta), rock goldenrod (Petradoria pumila), heartleaf twistflower (Streptanthus cordatus), and bladderpod (Physaria chambersii).

Mountain Brush

The mountain brush association generally borders the upper edge of the pinyon-juniper zone and extends into portions of the subalpine zone on steep rocky exposures. It also follows canyons and drainages well into the pinyon-juniper zone. Average annual precipitation is 38 cm (15 inches). Curlleaf mountain mahogany (Cercocarpus ledifolius), needleleaf mountain mahogany (Cercocarpus intricatus), Mormon tea (Ephedra viridis), black sagebrush, low sagebrush and pinyon are common in this association.

Aspen (Populus tremuloides), white fir (Abies concolor), and Douglas-fir (Pseudotsuga menziesii) are usually found in moist depressions, canyons and cool exposures on north-and north-east facing slopes. Rocky Mountain juniper (Juniperus scopulorum) is limited to shaded canyons and along higher-elevation ravines.



Subalpine

Cronquist et al. (1972) describe this association as the limber pine (Pinus flexilis)/bristlecone pine (Pinus longavea) zone. It is the open subalpine forest of the Basin Ranges and is best developed between 2865 m (9400 ft) and 3200 m (10,500). Annual precipitation is 46 cm (18 inches).

Common understory species include buckbrush (Ceanothus martinii), fleabane (Erigeron tener), rock mat (Petrophytum caespitosum), goldenweed (Haplopappus acaulis), buckwheat (Eriogonum ovalifolium), and desert parsley (Lomatium scabrum).



INVENTORY FINDINGS

The following section is the results of the literature and herbarium search and field inventory. Headings such as Status, Synonyms, Original Citations, Historic Distribution, Taxonomic Discussion and Habitat Characteristics are the results of the literature and herbarium search. Inventory Findings are the results of the field search.

Target taxa found during the field inventory were grouped into populations based on their spatial relationships with each others. If target taxa occurred in the same locale (i.e., same mountain range), they were grouped together as the same population. This grouping was arbitrary and designed for simplicity and clarity. Our definition of population is "a group of similar individuals located in the same area." This definition is subjective and does not suggest any gene flow between individuals, but it does suggest some isolation by geographic barriers, distance, and habitat differences.

Each population is accompanied by a population code number consisting of the first two letters of the genus and species, and an arbitrarily assigned population identification number. For example, Drka 1-2 refers to population 1 of Draba kassii, and 2 refers to the number of reported locations within this population.

Populations are generally numbered from north to south and west to east. Population code numbers appear on the population habitat forms, USGS quads, 1:100,000 land status maps, text general distribution maps, and text photographs. Population code numbers



are accompanied by a locality name to expedite recognition of the geographic location within the study area. The following population codes and locality names are used:

Cryptantha compacta

Crco-1 (Chevron Ridge)
Crco-2 (Crystal Peak)
Crco-3 (Burbank Hills)

Draba kassii

Drka-1 (Basin Creek)

Eriogonum ammophilum

Eram-1 (House Range)
Eram-2 (Ferguson Desert)
Eram-3 (Confusion Range)

Penstemon concinnus

Peco-1 (Tunnel Springs)
Peco-2 (Mountain Home Pass)

Sphaeralcea caespitosa

Spca-1 (Mountain Home Range)
Spca-2 (Tule Valley, south end)



CRYPTANTHA COMPACTA Higgins

Family: Boraginaceae

Common name: Compact catseye

Status: Category two

Original citation: Higgins, L. 1968. Great Basin Naturalist 28:196-197. Type: 8 miles W. of Desert Experiment Station, Millard Co. (Higgins 1613).

Taxonomic discussion: C. compacta suggests a dwarf, softly hairy, smaller-flowered form of the more widespread C. humilis. C. humilis is widespread throughout Utah and adjacent Nevada, Arizona, and California. Welsh et al. (1978) conclude that C. humilis is the most variable of all Utah cryptanthas. In a previous treatment of the Utah borages, he recognized four varieties.

Cronquist et al. (1972) note that C. compacta forms taxonomically significant populations, but it is not easy to separate C. compacta from small forms of C. humilis in the herbarium.

Habitat and phenology: Dry, open slopes, rock outcrops, and barren clay soils in the mixed-desert shrub, pinyon-juniper, and mountain shrub zones. Elevation range is 1350-2900 m (4428-9512 ft). Flowering time is May.

Historic distribution: Juab, Millard, Beaver, San Pete, Sevier, Garfield, and Tooele counties., Utah. To be expected in Nevada.

Inventory findings: Three occurrences of Cryptantha compacta in three sections, representing three populations, are reported



(Figure 2). Figure 3 shows the Chevron Ridge population (Crco 1-1) and habitat, Figures 4 and 5 the Burbank Hills (Crco 2-1) and Crystal Peak (Crco 3-1) populations.

The preliminary literature and herbarium research reported C. compacta to be widespread in the study area. We collected 20-25 specimens from different locations throughout the study area and about 15 or more keyed to C. compacta. When I submitted these specimens to Dr. Larry Higgins (Boraginaceae specialist, Dixie College) for final verification, he said "most of our material looks more like Cryptantha humilis than Cryptantha compacta." Because some of the material had premature nutlets, it was difficult to identify for certain.

Dr. Higgins commented that C. compacta is restricted to barren, limestone, gravel mounds in western Millard and Beaver counties, and its distributional range is much narrower than previously documented. Cronquist et al. (1972) cites the taxon occurring west of the Wasatch Range in Juab, San Pete, Sevier, and Garfield counties. Welsh et al. (1987) also believe the taxon has a wider distribution, extending as far north as Tooele County. The literature and herbarium research also indicated that C. compacta occupies a wider variety of habitats than suggested by Higgins.

For the present, we have taken the conservative approach and reported only three populations of C. compacta. These populations are tentative at best, and it is suggested that more taxonomic field work is needed to distinguish small forms of C. humilis from



C. compacta. Based on this report, changes may have to be made in Utah flora concerning size of corolla tube and calyx at anthesis of



Cryptantha compacta

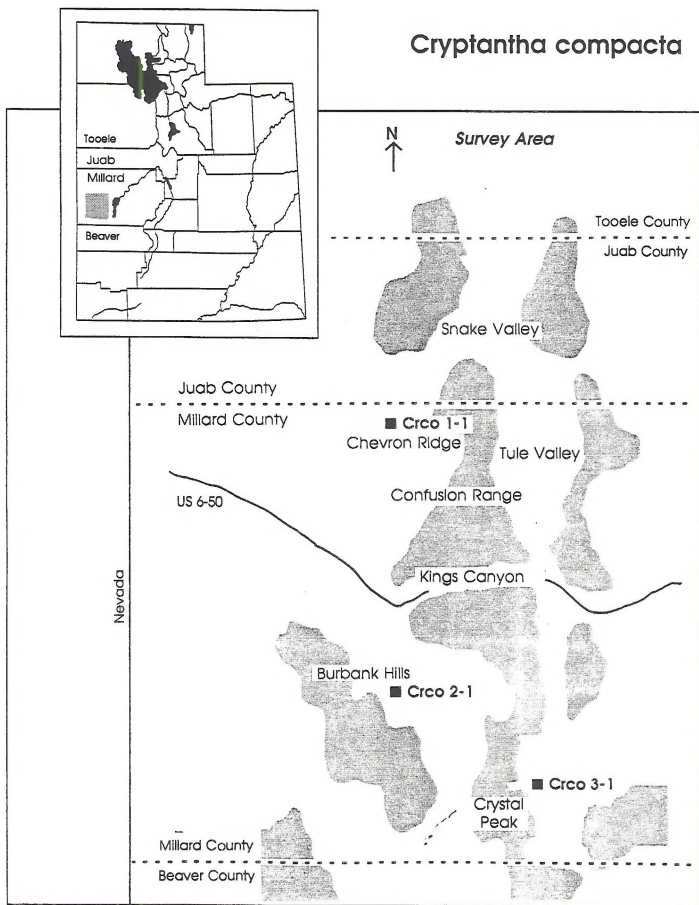


Fig. 2 - Distribution of *Cryptantha compacta*





Figure 3. Cryptantha compacta at Chevron Ridge, T16S,R17W,NW4,S23 (Crco 1-1).





Figure 4. Cryptantha compacta in Burbank Hills, T23S,R17W,SW4,S19 (Crco 2-1).



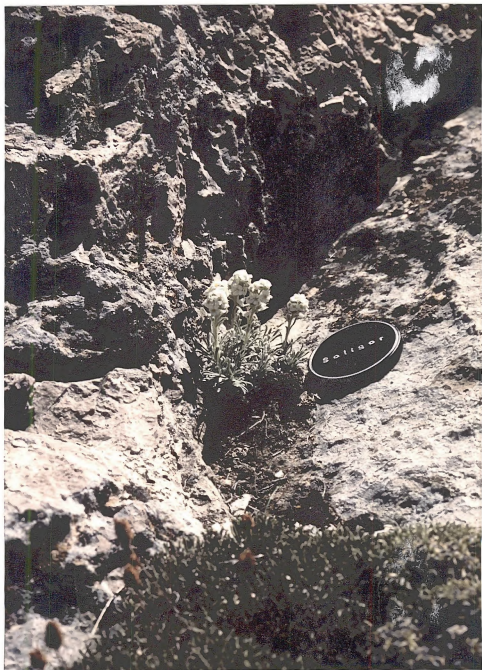


Figure 5. Cryptantha compacta at Crystal Peak
T23S,R16W,NE4,SW4,S24 (Crco 3-1).



both C. compacta and C. humilis (Welsh 1991). Recommendations for additional fieldwork are suggested in the following sections.



DRABA KASSII Welsh

Family: Brassicaceae

Common name: Kass rockcress

Status: Category two

Original citation: Welsh, S. L. 1986. Great Basin Naturalist 46:2. Type: Goshute Canyon, Deep Creek Mountains, Tooele County, Utah. Kass and Herrick 330.

Historic distribution: The only known location is Goshute Canyon on the east side of the Deep Creek Mountains in Tooele County.

Habitat and phenology: Draba kassii is found in the pinyon-juniper zone and montane shrub zone at approximately 2135 -2500 m (7000-8200 ft). This taxon is a sciophyte and prefers cool, north-facing slopes in canyons. Flowering time is mid-April to mid-May.

Inventory findings: Four occurrences of Draba kassii in four sections, representing one population are reported (Figure 6). The location in Big Canyon at the mouth of Basin Creek in the Deep Creek Mountains is a new Juab County record (Figure 7). The other three locations are in Tooele County (BLM Salt Lake District).

The Kass rockcress appears to be endemic to the Deep Creek Mountains. Its distribution extends for approximately 10 km (6 miles) from Big Canyon north to Chokecherry Canyon. The Deep Creek are composed of several geologic strata, the dominant one north of Big Canyon being Paleozoic and the Prospect Mountain quartzite extending in a small band on the northeast side of the range.



Draba kassii

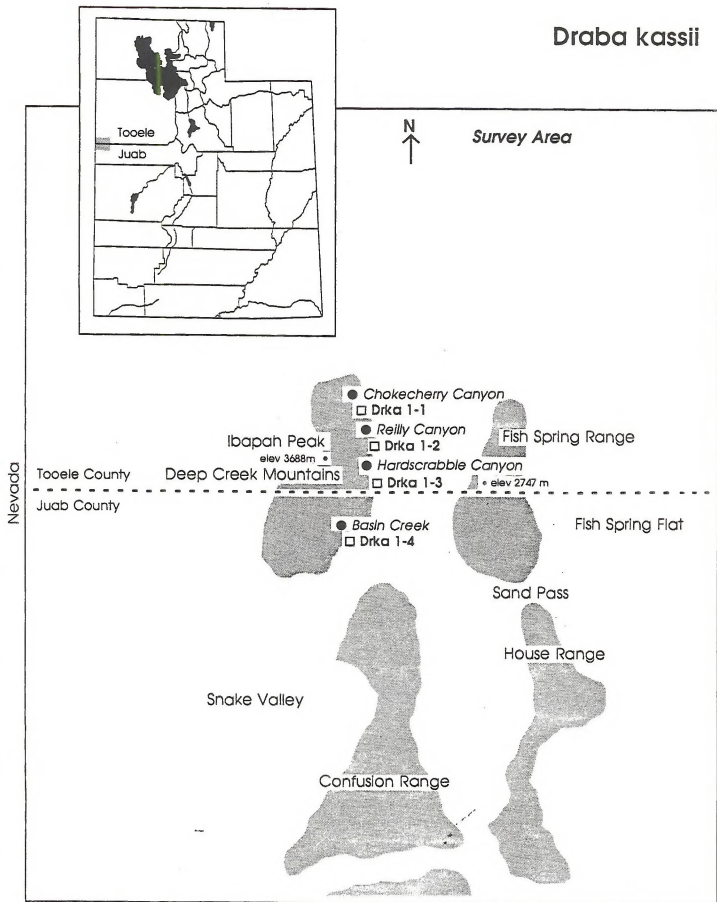


Fig. 6 - Distribution of *Draba kassii*





Figure 7. Mouth of Basin Creek. The dark rock to the right is the Prospect Mountain quartzite, habitat for Draba kassii.



It is within this strata that the target taxon can be found. D.kassii was originally cited as occurring on Tertiary granite (Welsh 1986). We found it occurring exclusively on Prospect Mountain quartzite and not on the previously cited granites.

The fractured quartzite crevices are deposition zones for soil and organic matter and provide a moisture substrate for establishment and growth (Figure 8). The rockcress grows vigorously in shaded areas, and no plants were found growing in full sunlight. The rockcress apparently reproduces by seed, as we observed seedlings in all locations visited. Most individuals were in flower by May 1 (Figure 9) with mature fruit by June 1 (Figure 10).

We searched similar habitat and geology throughout the study area and did not find D.kassii. Threats to this species are discussed in the Threats to survival section.





Figure 8. Habit and habitat of Draba kassii. Note fractured quartzite boulders and sparse cover of associated species.





Figure 9. Flowering plant in Big Canyon, T11S,R18W,SE4,SE4,S1 (Drka 1-4).





Figure 10. Mature fruits of Draba kassii.



PENSTEMON CONCINNUS Keck

Family: Scrophulariaceae

Common name: Tunnel Springs Beardstongue

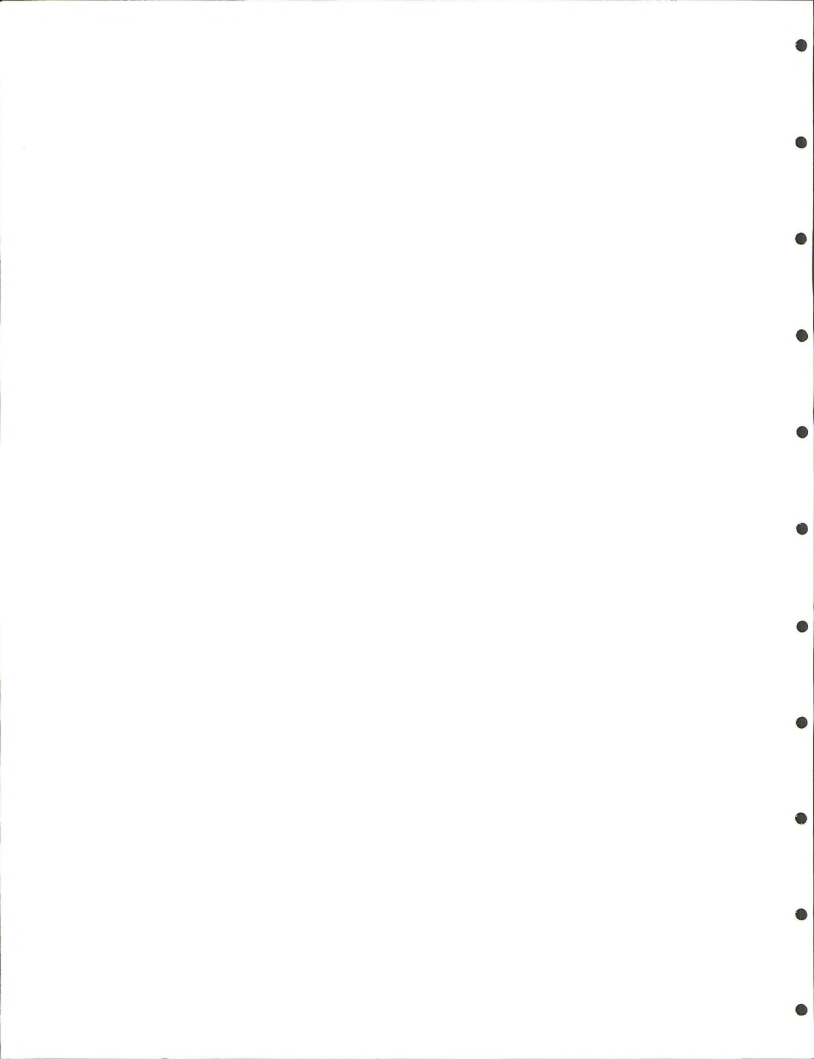
Status: Category two

Original citation: Keck, D. 1940. American Midland Naturalist 23:608. W. P. Cottam 5635. Type: Tunnel Springs, ca 10 miles E. of Garrison, 1675 m elev., Millard Co., Utah, 28 June 1933.

Habitat and phenology: Gravelly bluffs and limestone and dolomite outcrops in the mixed-desert shrub, sagebrush and pinyon-juniper zones. Elevation range is 2047-2460 m (6240-7500 ft). Flowering time is June.

Historic distribution: Tunnel Springs, Mountain Home, Burbank Hills and Wah-Wah Mountains., Millard and Beaver counties, Utah; Snake Range, White Pine Co., Nevada.

Inventory findings: Six occurrences of Penstemon concinnus in six sections, representing two populations, are reported (Figure 11). We found the target taxon (Peco 2-1) about 3 miles northeast of its previous discovery at Mountain Home Pass by S. L. Welsh. It occurs on Joana limestone gravels in the pinyon-juniper woodland at 2160 m (7084 ft). We counted about 100 individuals in a 4 ha. (10 acre) area at Peco 2-2, which represented the largest occurrence of the six reported (Figure 12). We also found the target taxon (Peco 1-3) at the type locality and located two occurrences (Peco 1-2, 1-3) about 3 miles north of the type locality.



Penstemon concinnus

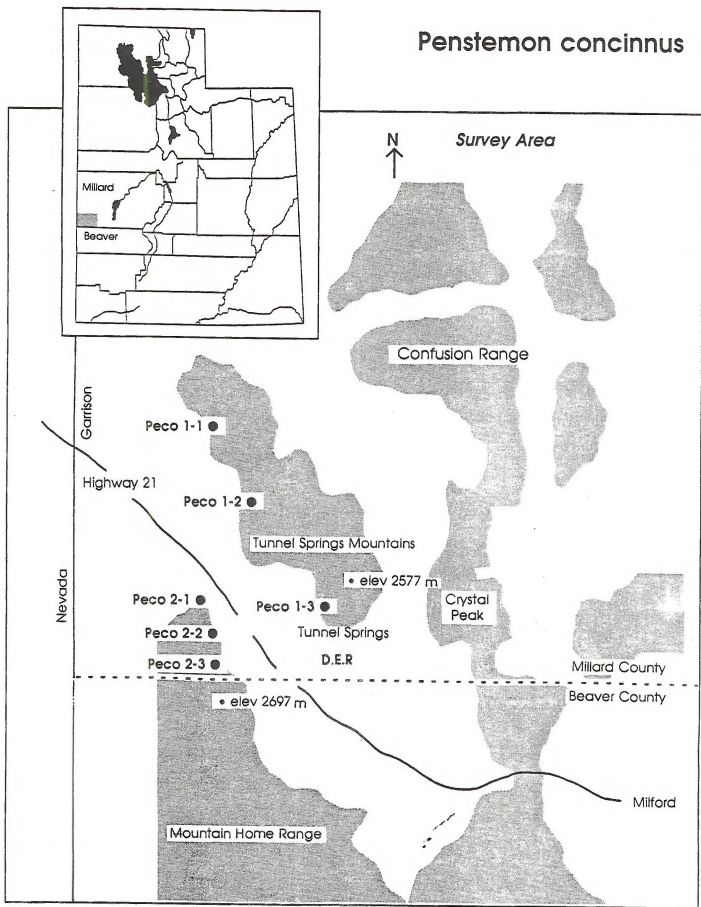


Fig. 11 - Distribution of *Penstemon concinnus*



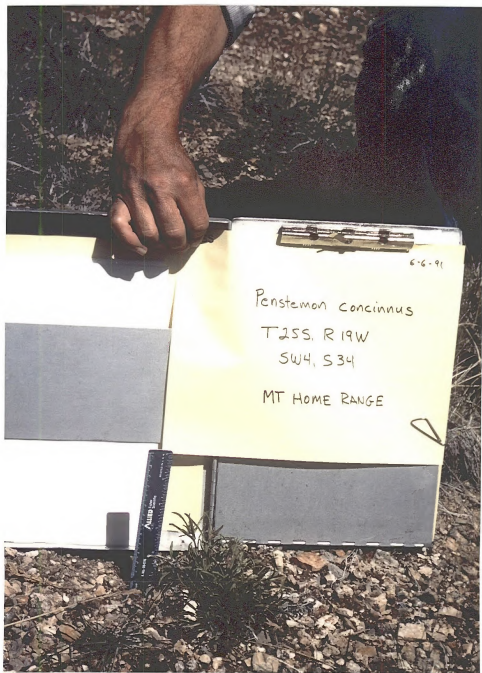
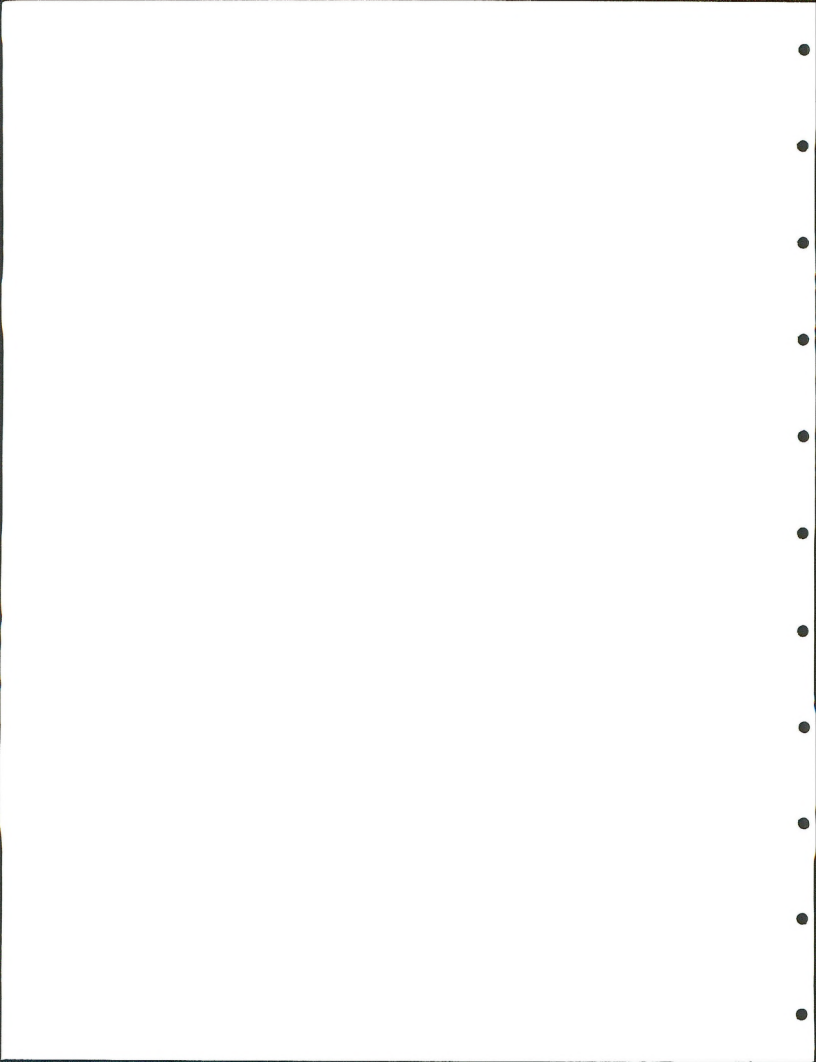


Figure 12. Penstemon concinnus in late bud (Peco 2-2).



The type locality habitat (Peco 1-3) is mixed-desert shrubs with scattered junipers; the geology is Sevy dolomite (Figure 13). We walked the entire length of the west side of the Tunnel Springs Mountains and counted 20 individuals. We did not find any new locations of the target taxon on the east side of the Tunnel Springs, although potential habitat exists. Figure 14 shows the beardstongue in flower and Figure 15 shows seedlings. This taxon has been reported to occur in the Burbank Hills (Cronquist et al. 1972), but we did not relocate it.



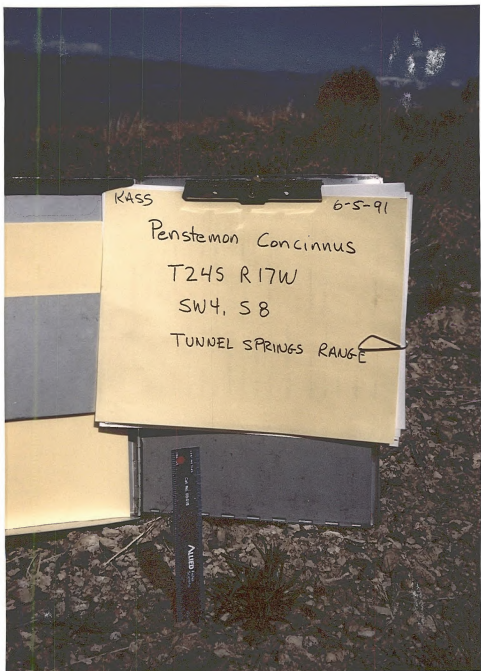


Figure 13. Penstemon concinnus at the type locality (Peco 1-3).





Figure 14. Flower of Penstemon concinnus at type locality (Peco 1-3).

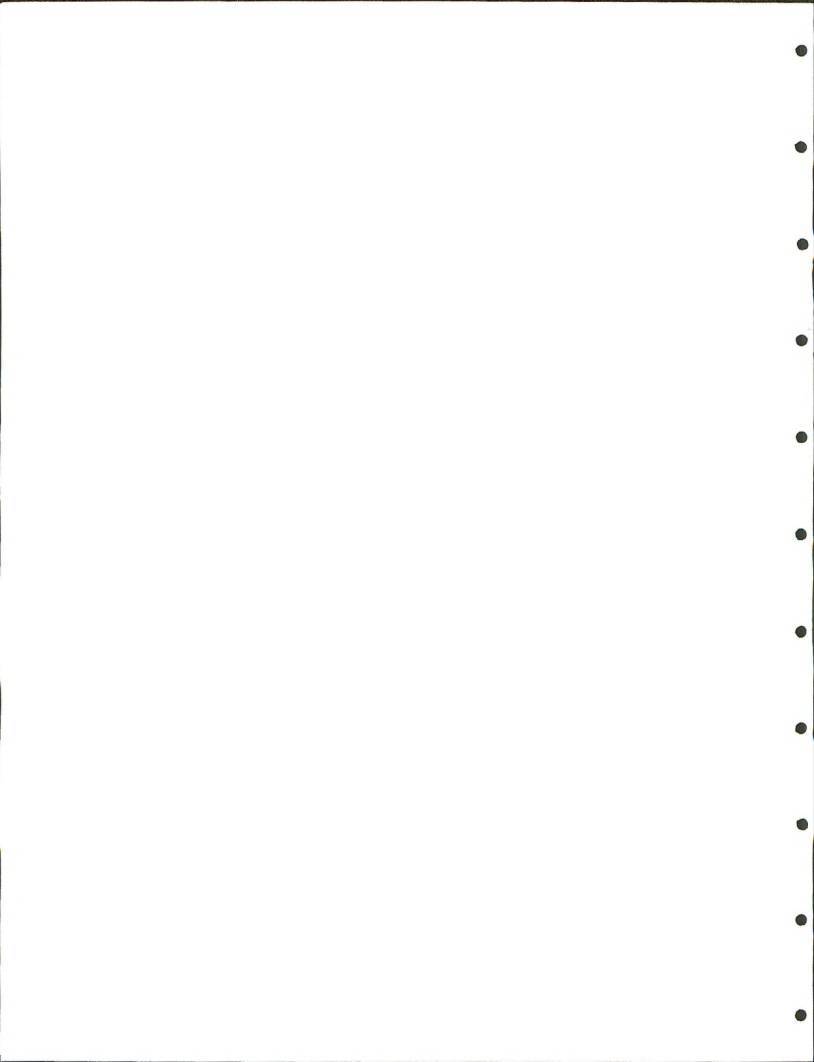




Figure 15. Seedlings of Penstemon concinnus. Notice limestone/dolomite substrate.



ERIOGONUM AMMOPHILUM Reveal

Family: Polygonaceae

Common name: Ibex buckwheat

Status: Category two

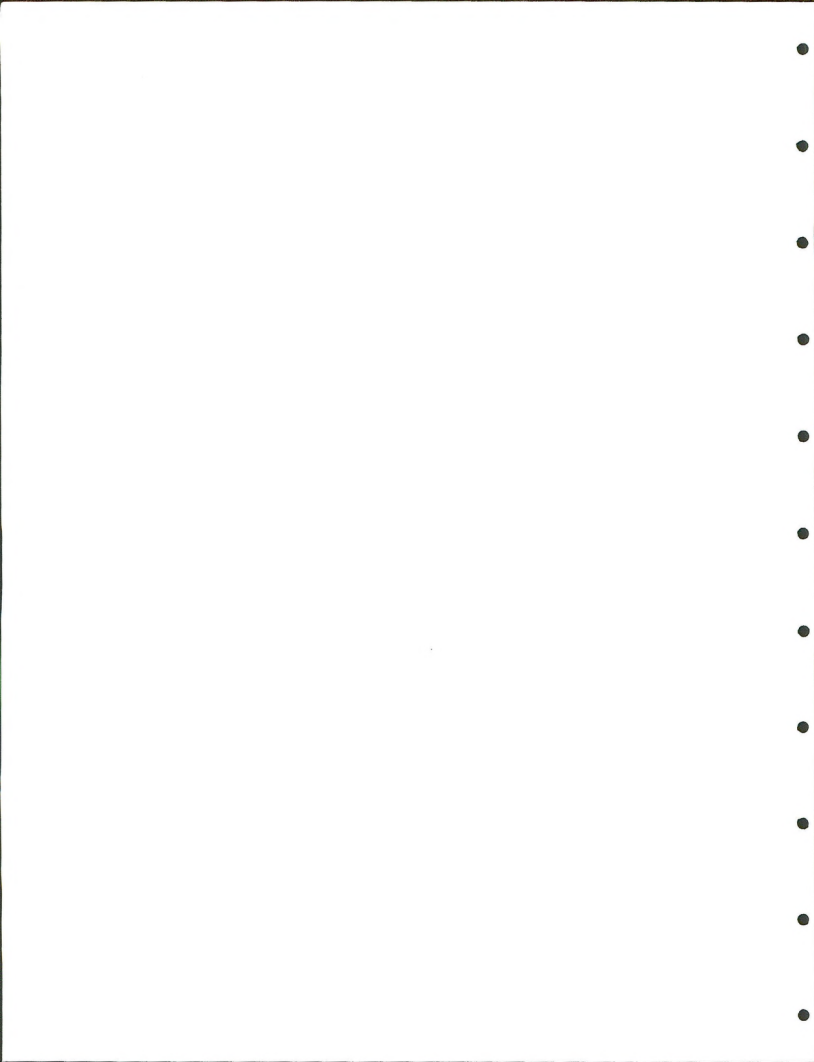
Original citation: Reveal, J. L. 1972. Phytologia 23:163. Type: from Ibex Warm Point, Confusion Range, Millard Co. Holmgren and Holmgren 4650.

Synonyms: This plant was reduced to varietal rank within E. nummulare by Welsh (1984).

Habitat and phenology: This plant occurs on aeolian sands in the mixed-desert shrub and pinyon-juniper zones. Elevation range is 1585-1890 m (5200-6200 ft). Flowering time is August-October.

Historic distribution: Tule, Whirlwind, and Snake valleys, and the Ferguson Desert, Millard and Juab counties, Utah.

Inventory findings: Ten occurrences of Eriogonum ammophilum in ten sections, representing three populations, are reported (Figures 16 and 17). Eram 1-1 occurs east of House Range (Figure 18); Eram 2-1 occurs in the Ferguson Desert (Figure 19), just south of the Conger Range; and Eram 3-5 occurs at the south end of the Confusion Range (Figure 20). Melanie Mendenhall of the BLM Warm Springs Resource Area provided several historic locations of the buckwheat and the following were confirmed: T15S,R19W,SE4,S22 just north of Gandy, and T22S,R14W,NE4,S7,S19 in Blind Valley, and T22S,R14W,NW4,S26 in Tule Valley. All other historic locations are indicated on the BLM 1:100,000 land status maps



This species is restricted to aeolian (psamments) and alluvial sands (fluvents) throughout the study area (Figure 21). The distribution center for this taxon appears to be at the south end of Confusion Range and extends northeast into Tule and Whirlwind valleys and northwest into the Ferguson Desert and Snake Valley. Total population size is difficult to estimate, but at a given location, population size is small. Threats and management recommendations are in the following sections.



Eriogonum ammophilum (Eram 1)

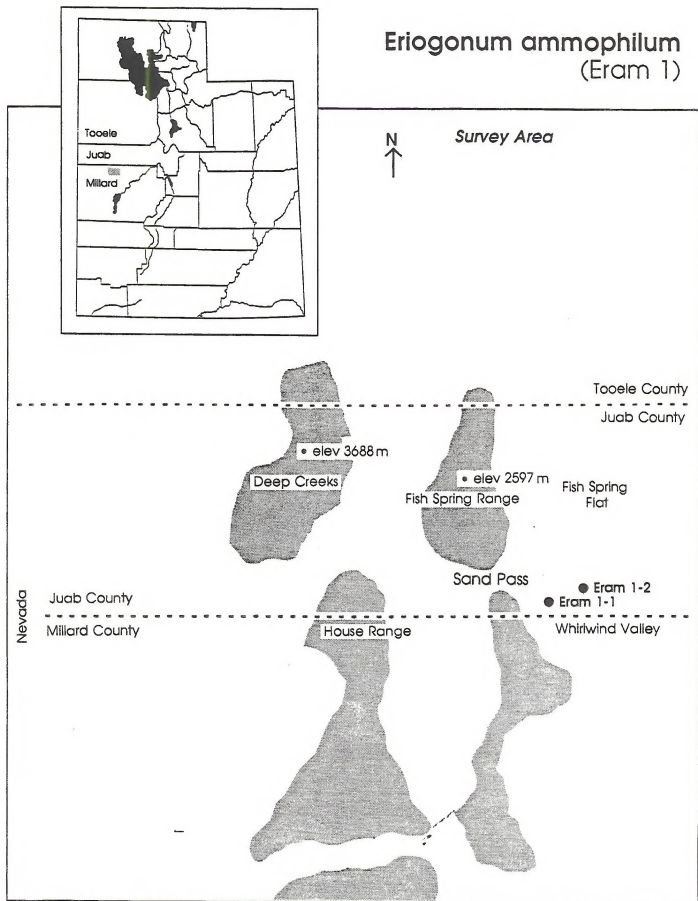


Fig. 16 - Distribution of *Eriogonum ammophilum*



Eriogonum ammophilum (Eram 2,3)

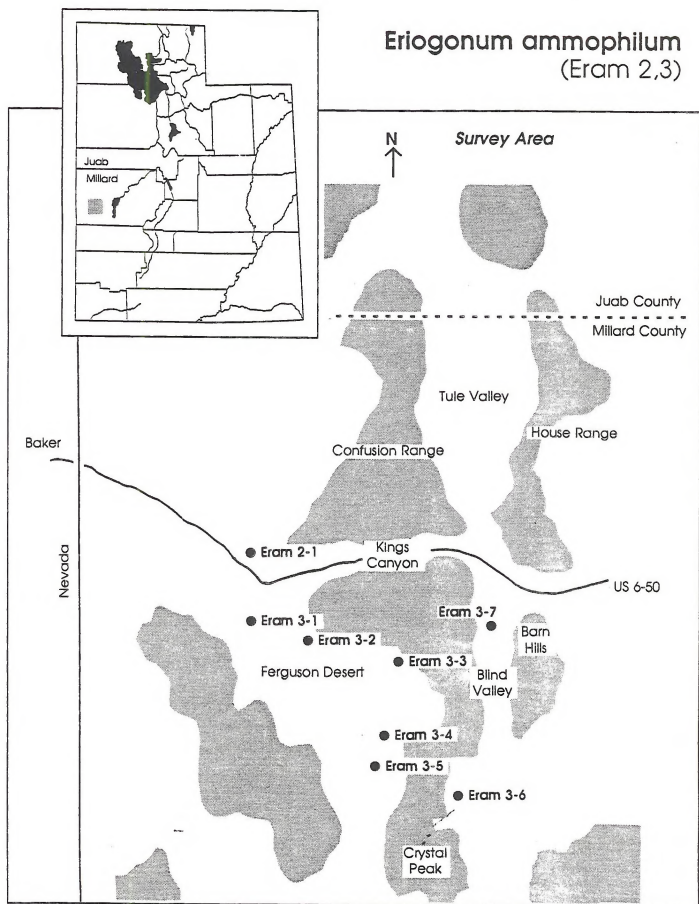


Fig. 17 - Distribution of *Eriogonum ammophilum*





Figure 18. Eriogonum ammophilum east of Sand Pass in the House Range (Eram 1-1).





Figure 19. Eriogonum ammophilum at the Ferguson Desert in the (South Conger Range, (Eram 2-1). Plant in vegetative condition.



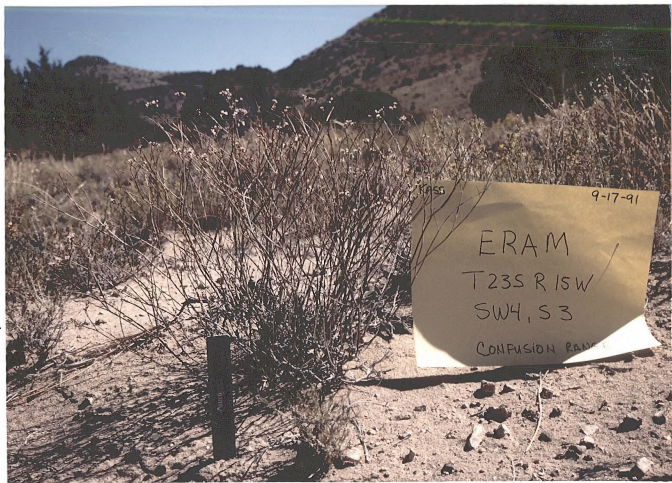


Figure 20. Eriogonum ammodendrum in flower in the Confusion Range (Eram 3-5).

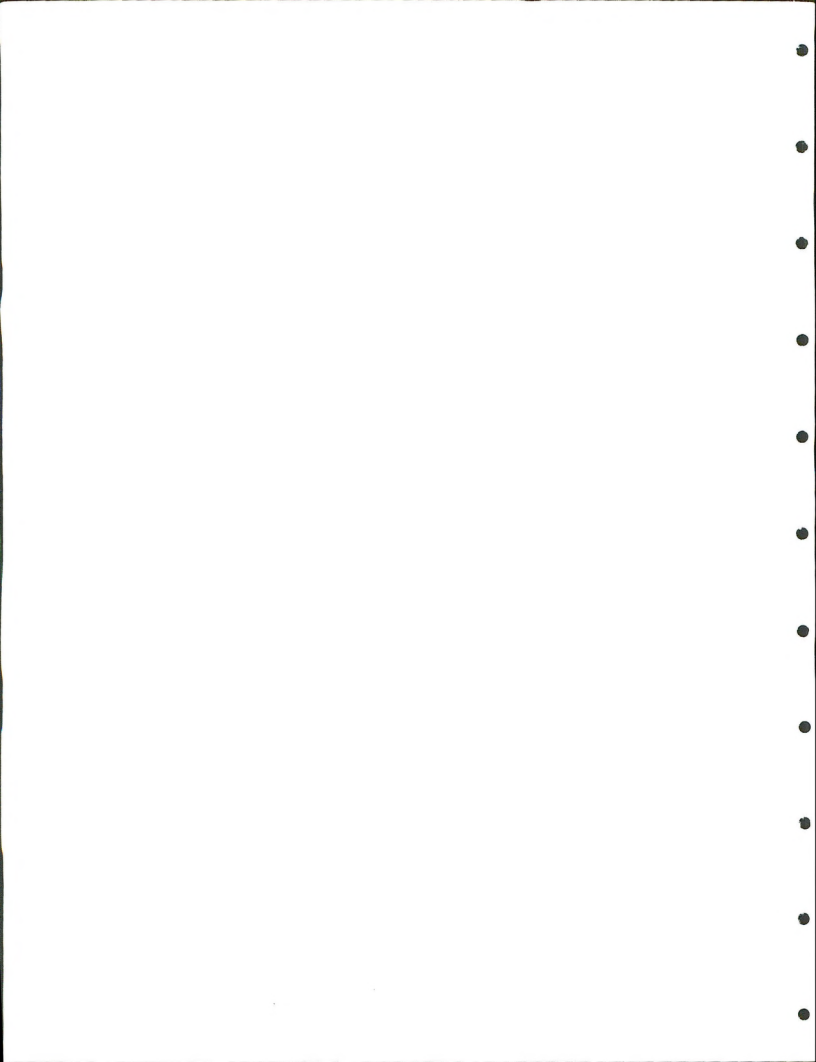




Figure 21. Sand dune habitat of Eriogonum ammophilum.



SPHAERALCEA CAESPITOSA Jones

Family: Malvaceae

Common Name: Jones globemallow

Status: Category two

Original citation: Jones, M. E. 1908. Contribution to Western Botany 12:4.

Habitat and phenology: The Jones globemallow is restricted to limestone and dolomite slopes, especially the Sevy Dolomite Formation in the salt and mixed-desert shrub and pinyon-juniper zones. Elevation range is 1524-1981 m (5000-6500 ft). Flowering time is June and early July.

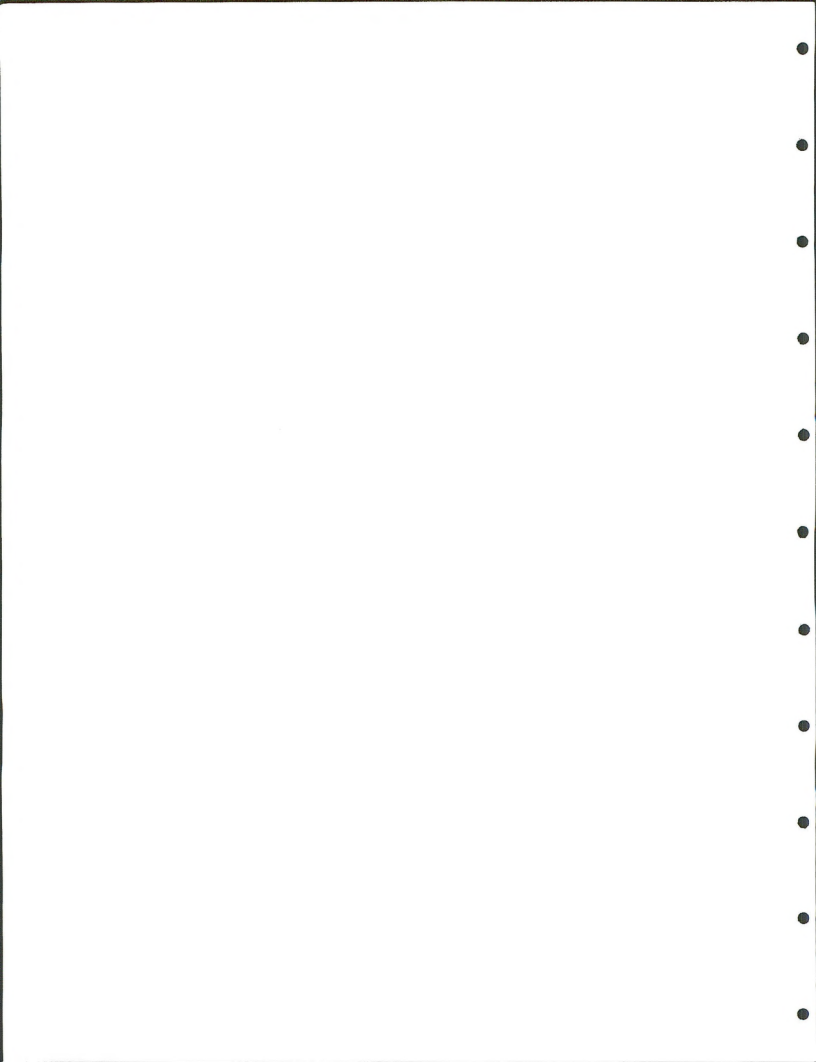
Historic distribution: Millard and Beaver counties, Utah; Nye County, Nevada.

Inventory findings: Eight occurrences of Sphaeralcea caespitosa in eight sections, representing two populations are reported (Figure 22). Figure 23 shows the habitat and flower.

We did not find any flowering individuals during the entire survey; consequently, the locations are tentative, at best. We collected vegetative material to compare with herbarium specimens for some positive means of identification. We also visited known locations to see if these plants were flowering, however we had very little success relocating individuals and if we did locate an individual, it was not flowering. All plants we observed were grazed very heavily by antelope and/or domestic sheep. Severe defoliation by grazing herbivores could be responsible for this



condition. Recommendations to revisit these newly discovered populations are suggested in the section Recommendations for Additional Study.



Sphaeralcea caespitosa

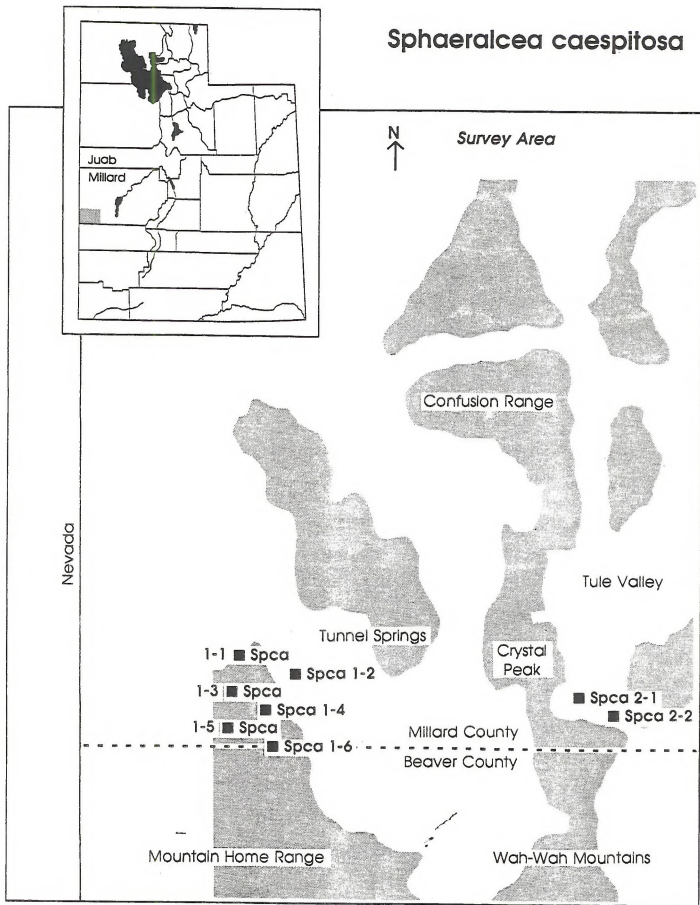


Fig. 22 - Distribution of *Sphaeralcea caespitosa*

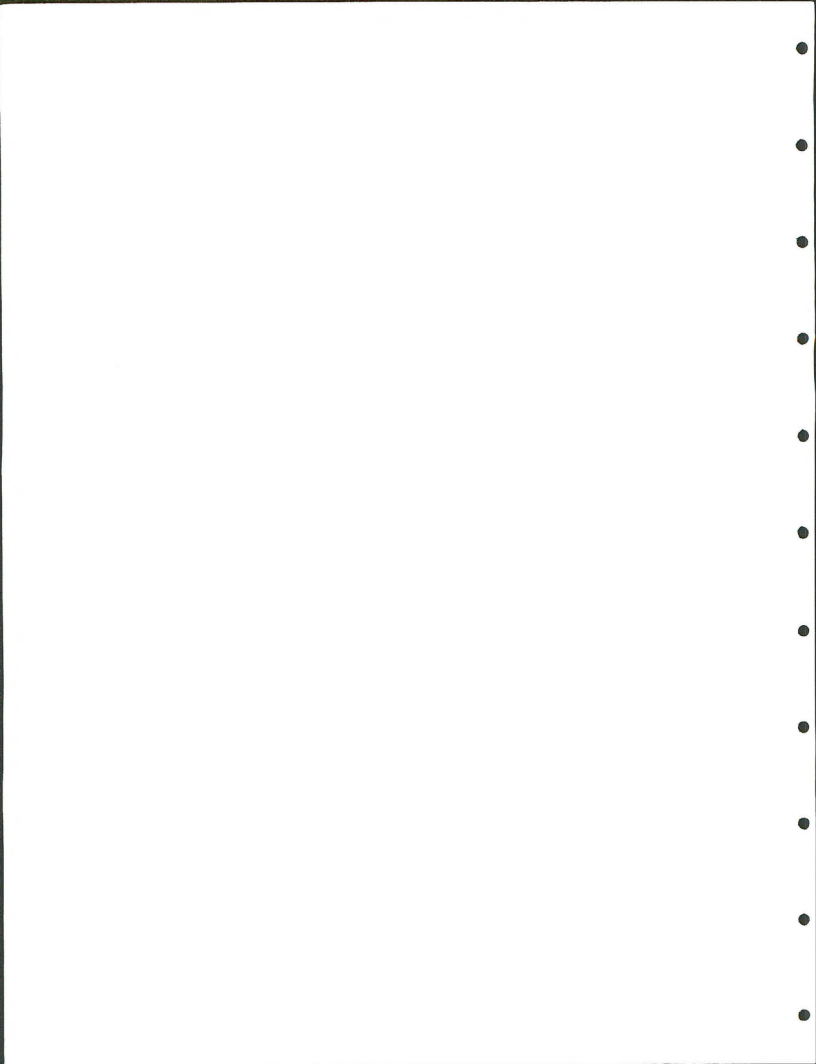
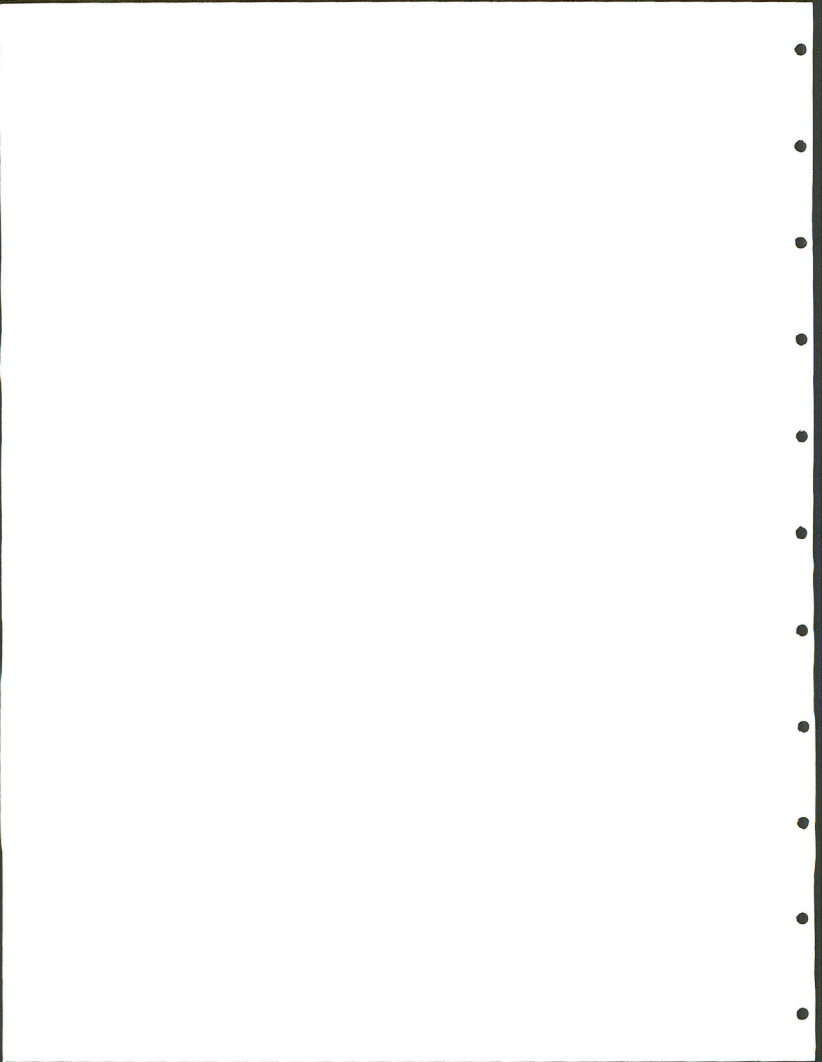




Figure 22. Sphaeralcea caespitosa in flower. Photo courtesy of S. L. Welsh.



NO FINDING RESULTS

This section reports the results of the literature and herbarium search and taxa we did not find or relocate during the field inventory. A photograph of the target taxon is included if it was available. The following taxa were not found in the study area: Astragalus uncialis, Cuscuta warnerii, Epilobium nevadense, Frasera gypsicola, and Haplopappus crispus, Jamesia tetrapetala, Penstemon angustifolia var. dulcis, Primula domensis, and Trifolium andersonii var. friscanum.



Astragalus uncialis Barneby

Family: Fabaceae

Common name: Inch-high milk vetch

Status: Category two

Original citation: Barneby, R. P. 1942. Leaflets of Western Botany 3:101. Type: Ripley and Barneby, northeastern Nye County, Nevada, 5300 ft, May 22 1941.

Habitat and phenology: Dry knolls and slopes, saline sand, or clays usually with a gravelly pavement. Shadscale and budsage community at elevations of 1402-1615 m (4600-5300 ft). Flowering time is May.

Historic distribution: Northeastern Nye County, Nevada, and about 30 miles southwest of Delta, Millard County, Utah.

Comments: This taxon occurs in small, local populations in only two reported areas. It is not easily recognized because of its small size and early flowering period in April and early May. When we visited the Long's Ridge location on May 13, the plants were in mature fruit (Figure 24). It should be searched for in similar habitats throughout the eastern Great Basin (Mozingo and Williams 1980).

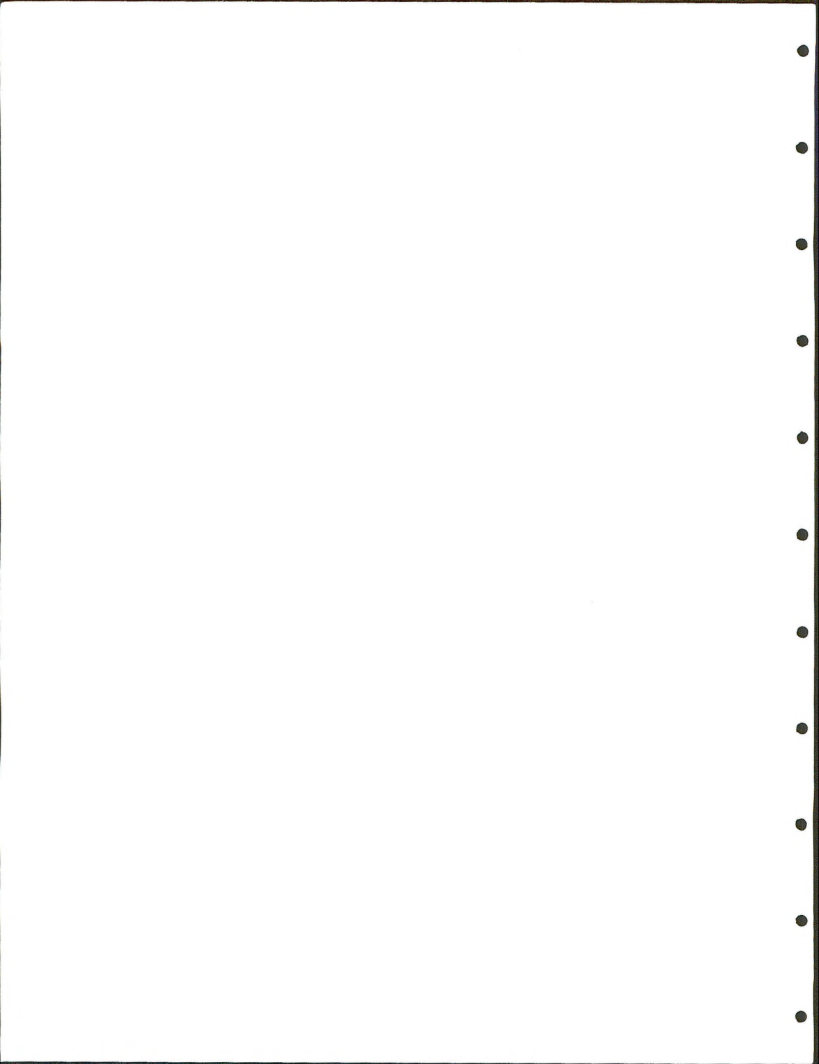
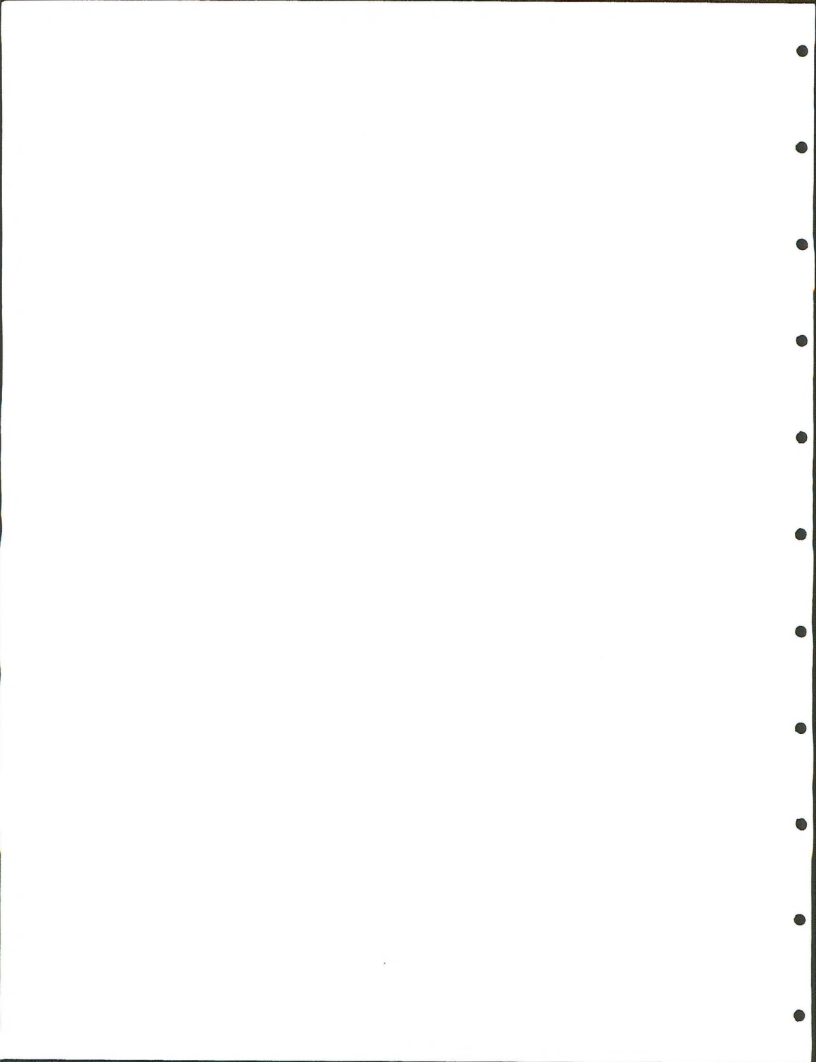




Figure 24. Astragalus uncialis in mature fruit at Long's Ridge, T19S,R11W,S17. Photo courtesy of S. L. Welsh.



CUSCUTA WARNERI Yuncker

Family: Cuscutaceae

Common Name: Dodder

Status: Category two

Original citation: Yuncker, T. G. 1960. Brittonia 12:38. Type: vicinity of Flowell, 15 miles west of Fillmore, Millard County, Utah. Sept. 1957.

Habitat and phenology: Salt desert shrub zone. Flowering time is August to September.

Historic distribution: near Fillmore, Millard County, Utah.

Comments: This taxon is parasitic on Phyla cuneifolia, a species uncommon in the Great Basin, but locally abundant near a temporary lake known as the "Sink." Mr. Lloyd Warner and Kaye Thorne (BYU) conducted a search of the type locality (BYU) but were unable to locate the dodder, though the Phyla was common (Welsh and Chatterly 1985). This species is believed to be extinct (Welsh et al. 1986).



EPILOBIUM NEVADENSE Munz

Family: Onagraceae

Common name: Nevada willowherb

Status: Category two

Original Citation: Munz, P. 1929. Bulletin of the Torrey Botanical Club 56:166. Type: Jaeger, Charleston Mountains, Clark County, Nevada, 9200 ft., Sept. 4, 1927.

Historic distribution: Clark County, Nevada; Millard (Canyon Mountains), Iron (Zion National Park), and Washington counties, Utah.

Habitat and phenology: Limestone talus slopes and rock outcrops. Pinyon-juniper, mountain shrub, ponderosa pine and aspen zones at 2286-2804 m (7500-9200 ft). Flowering time is August to September.

Comments: This taxon is more widely distributed than previously recognized in Nevada, but is narrowly restricted in Utah (Franklin 1991). A photograph is not available for the taxon.



FRASERA GYPSICOLA (Barneby) D. M. Post

Family: Gentianaceae

Common name: Sunnyside green gentian

Status: Category two

Original citation: Barneby, R. P. 1942. Leaflets of Western Botany 3:155. Type: Ripley and Barneby, near sunnyside, Nye County, Nevada, 4950-5000 ft, July 20, 1941.

Synonyms: Swertia gypsicola, Post, D. M. 1958. Botanical Gazette 120:3.

Historic distribution: Eastern Nye County, Nevada, and Millard County, Utah.

Habitat and phenology: Clay soils encrusted with mineral salts; greasewood and shadscale flats at 1700 m (5576 ft). Flowering time is July.

Comments: This taxon is known from only two locations and both populations are very small. We spent very little time looking for this species because it was known to occur in the northern part of the study area. The location near Gandy, Utah should be revisited as an additional inventory is needed. A photograph is not available for this taxon.



HAPLOPAPPUS CRISPUS L. C. Anderson

Family: Asteraceae

Common name: Pine Valley goldenbush

Status: Category two

Original citation: Anderson, L. C. 1983. Great Basin Naturalist 43:358-364. Type: Washington Co., Utah. Whipple Valley Trail, above Pine Valley, 8100 ft, Sept. 18, 1981.

Historic distribution: Pine Valley Mountains

Habitat and phenology: Spruce-fir, aspen, manzanita, and mountain. mahogany zones. Elevation range is 2469-2804 m (8100-9200 ft).

Flowering time is September.

Comments: A photograph is not available for this taxon.



JAMESIA TETRAPETALA Holmgren & Holmgren

Family: Saxifragaceae

Common name: Jamesia

Status: Category two

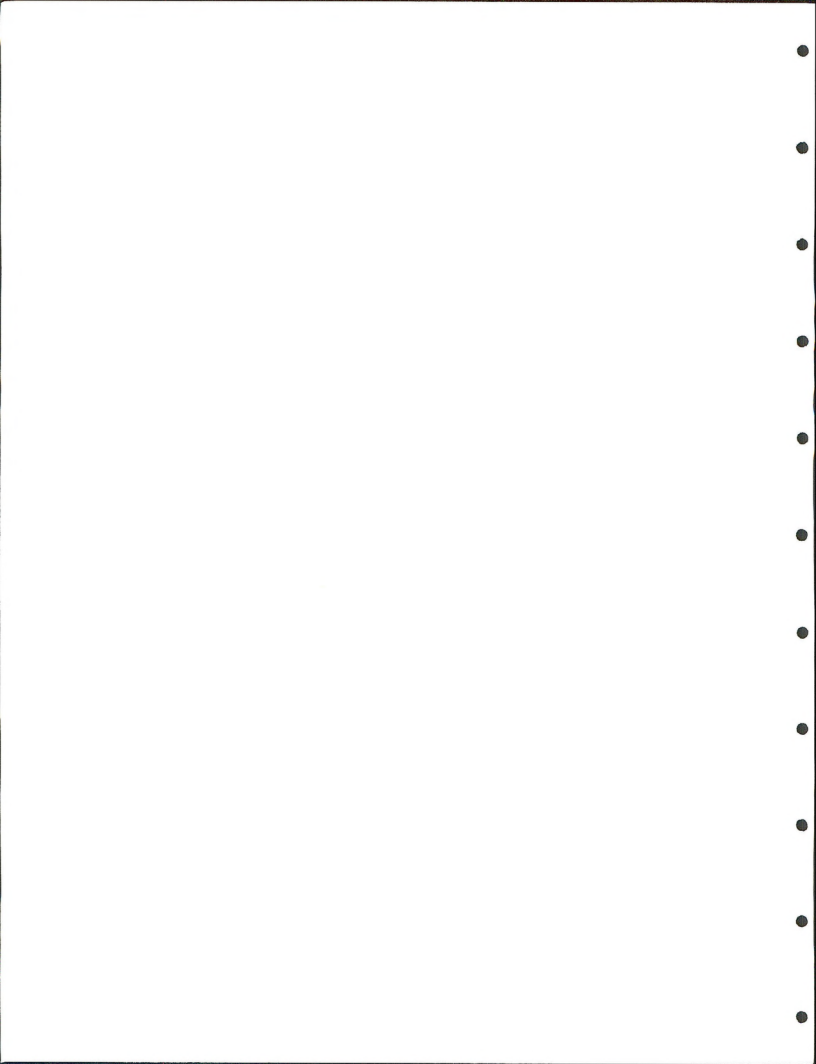
Original citation: Holmgren, N., and P. Holmgren. 1989. Brittonia 41:348-349. Type: Snake Range, White Pine County, Nevada. Holmgren & Holmgren (10823), June 8, 1985.

Taxonomic discussion: This taxon is easily recognized by its tetramerous flowers and nearly always solitary-flowered inflorescences (Holmgren and Holmgren 1989). It is distinguished from the common Jamesia americana by its four-petal instead of five-petal habit.

Historic distribution: Snake Range in White Pine County, Grant Range in Nye County, and Highland Range in Lincoln County, Nevada; House Range in Millard Co., Utah.

Habitat and phenology: Cracks and crevices in Cambrian limestone cliffs and talus at the cliff bases. Elevation range is 2000-3320 m (6560-10,890 ft). Flowering time is June and early July.

Comments: This species is endemic to the eastern Great Basin and can probably be found elsewhere in Utah. A photograph is not available for this taxon.



PENSTEMON ANGUSTIFOLIA PURSH VAR. DULCIS NEESE

Family: Scrophulariaceae

Common name: Canyon Mountain beardstongue

Status: Category two

Original citation: Neese, E. 1983. Great Basin Naturalist 46:459.
Type: Millard Co., Utah. Canyon Mts., Sevier Desert, S. Goodrich,
May 19, 1981.

Habitat and phenology: Aeolian sands in salt desert shrub,
sagebrush, and pinyon-juniper communities at 1400-1650 m (4592-5412
ft). Flowering time is June.

Historic distribution: Canyon Mountains, Little Sahara Sand Dunes,
in Millard and Juab counties.

Comments: This species appears to be endemic to eastern Millard
and Juab counties. A photograph is not available for this taxon.



PRIMULA DOMENSIS Kass & Welsh

Family: Primulaceae

Common name: House Range primrose

Status: Category two

Original citation: Kass, R. J. 1985. Great Basin Naturalist 45:548-550. Type: House Range, Sawtooth Canyon, R. Kass and J. Kass (884), June 1982.

Historic distribution: House Range endemic, Millard County, Utah.

Habitat and phenology: Shaded limestone cliffaces, in the mountain shrub zone. Elevation range is 2362-2590 m (7200-8495 ft).

Flowering time is May.

Comments: We searched for this taxon in the Confusion, Wah-Wah, and Mountain Homes ranges and did not find potential habitat. An extensive search by the author (this survey) and the Utah Heritage Program (Franklin 1991) found no new locations of this taxon. Recommendations for a change in listing status and management are found in the following sections. Figure 25 shows the flower and limestone substrate.





Figure 25. Primula domensis flowering in Sawtooth Canyon,
T19S, R14W, NE4, S23.



TRIFOLIUM ANDERSONII Gray VAR. FRISCANUM Welsh

Family: Fabaceae

Common name: Frisco clover

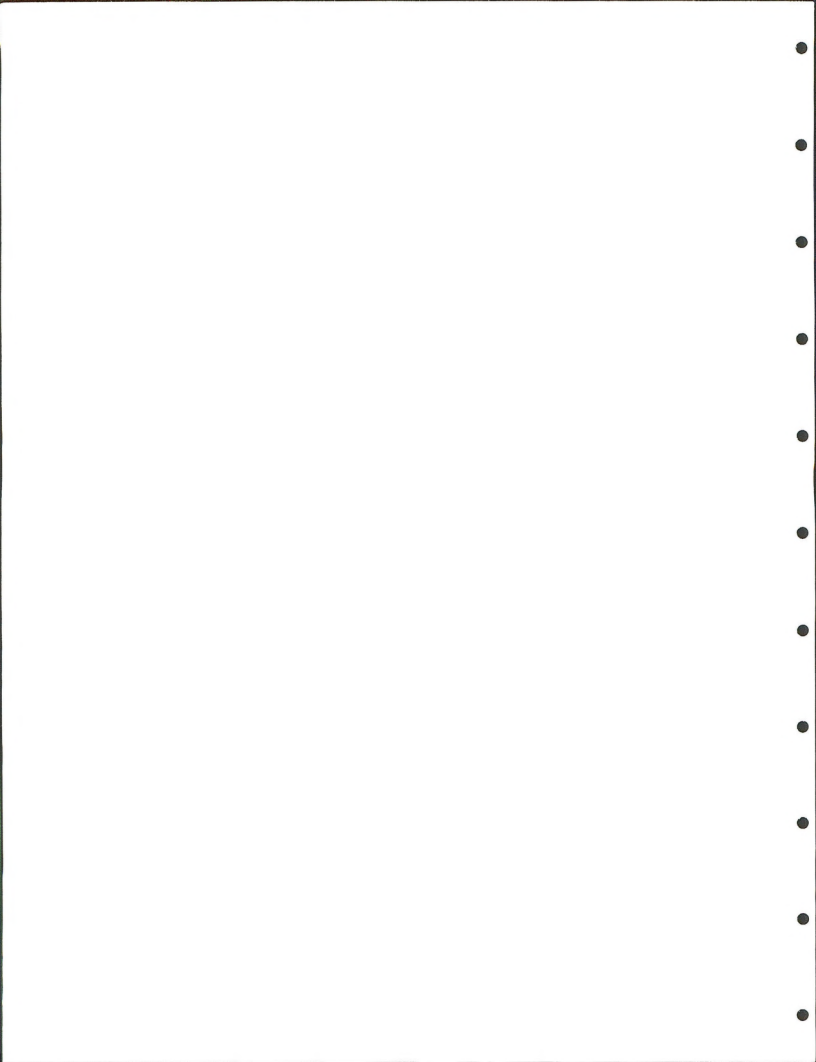
Status: Category two

Original citation: Welsh, S. L., 1978. Great Basin Naturalist 38:355. Type: Frisco Peak, San Francisco Mountains, Beaver County.

Historic distribution: San Francisco and Tunnel Springs Mountains, Beaver and Millard counties, Utah.

Habitat and phenology: Shaded limestone cliffaces in the mountain shrub zone. Elevation range is 2362-2590 m (7200-8495 ft).

Comments: We searched for this taxon in the Confusion, Wah-Wah and Mountain Homes ranges and did not find it, nor did we relocate it in the Tunnel Springs Mountains. A photograph is not available for this taxon.



CONCLUSIONS

Species Management Recommendations

This section provides information about the known biological status of each of the target taxa and suggests possible management alternatives. Population monitoring is suggested as a tool to further understand population dynamics. Population monitoring is a comprehensive, research-oriented process that is both labor and time intensive, and requires several field seasons to gather meaningful information that will contribute to the existing knowledge of the target taxa. Population surveillance is suggested as a management tool to evaluate the current condition of plants and habitat destruction or obvious decline in population numbers. This process is an annual or biennial inspection that requires minimal commitment of time and labor.

Draba kassii

This species fits the criteria of "rare" as described by Rabinowitz (1981): (1) small geographic range, (2) habitat specific, and (3) small population size. This species is restricted to the mid-elevation canyons of the Deep Creek Mountains and grows specifically on the Prospect Mountain quartzite. Population size is small, estimated at approximately 10,000. This estimate is conservative and should be considered as a best-guess estimate.

The Kass rockcress appears to require shade and cooler temperature typical of canyon habitats. Any destruction of



canyon slopes could have significant negative impacts on rockcress. I recommend close surveillance of populations in the Deep Creek Mountains, especially Goshute Canyon, and judicious management of existing habitat. Potential threats to this species will be discussed in the following section.

Eriogonum ammophilum

This species, though widely distributed throughout the study area, is not abundant at any location. Total population size is difficult to estimate, but at any given location, population size is small. I recommend the "sand dune" habitats be managed to avoid impacts such as off-road vehicles and a surveillance program be implemented to assure protection of existing populations.

Primula domensis

This very rare species appears to be restricted to Sawtooth Canyon in the House Range. It grows in a specialized habitat of cool, shaded limestone cliffaces. Population size is extremely small and estimated at 5000 individuals.

Sawtooth Canyon is the main access route to Notch Peak, and increased use of this trail can be anticipated in the future (Wasatch Mountain Club, 1991). Because primroses are very showy, they could be impacted by hikers during the flowering period of May and June. This anticipated impact could cause habitat destruction and subsequent population decline. I recommend close surveillance of plants and recreational activities in Sawtooth Canyon and possible monitoring in the future.



Threats to Survival

This section describes existing and potential threats to the target taxa. The threats discussed in this section are mainly anthropogenic, which are more apparent and easier to describe than biological threats.

In general, seismic activity and gold exploration is increasing in the Confusion and House ranges. Extensive mining activity could pose threats to existing special status plants. I recommend that any proposed activity with the potential for disturbing plant habitats be subject to a rare plant clearance by a qualified botanist. I also recommend that current exploration and mining be closely supervised and special status plants receive careful attention if there is proposed mining. The following threats will be addressed on a plant-by-plant basis.

Draba kassii

Gold mining is a potential threat to the Kass rockcress. Active mining at the Ellen Mining facility, constructed at the mouth of Goshute Canyon, was observed in this canyon during a visit in 1982 by the author. Evidence of historic mining was observed in Reilly Canyon during this survey. Both Goshute and Reilly canyons are in the BLM Salt Lake District and are included in this discussion as a reminder of the necessity to protect this rare taxon.

Any activity that would alter the "canyon habitat" could have significant negative impacts on the Kass rockcress.



Primula domensis

Historic mining for gold and silver has taken place in both Sawtooth and Miller canyons (Kass 1983). The small population size and the recent increase in gold exploration and recreational hiking represent potential threats to the primrose. Because of these threats, a change in listing status is recommended as discussed in the next section.

Changes in Listing Status

Astragalus uncialis

The inch-high milkvetch status has changed from 3c to 2c because of increased mining activity in the western Great Basin. This taxon should receive future medium priority inventory status as recommended by the Utah Native Plant Society (UNPS 1991).

Primula domensis

A change in listing status from category 2 to category 1 is recommended. The justification for the change is increase in mining and recreational activities in and near the House Range. The small primrose population size, estimated at 5000 individuals, has several consequences that could lead to extinction. Small populations are more subject to decline through (1) random environmental events (natural catastrophes), (2) chance events in survival and reproduction, and (3) loss of genetic variability through genetic drift or inbreeding depression (Soule and Wilcox 1980). Any anthropogenic threat to the habitat or plant could conceivably accelerate population decline and eventual extinction.



Draba kassii

It is possible that Draba kassii could also become a category 1 taxon if mining activity increases. This increased activity could jeopardize existing populations. Currently, I do not recommend a change in listing status for the Kass rockcress or the remaining category 2 species.

Recommendations for Additional Study

It is recommended that the following taxa receive additional study as a result of this inventory: Cryptantha compacta, Penstemon concinnus, and Sphaeralcea caespitosa. The justification for additional study is discussed below on a species-by-species basis.

Cryptantha compacta

This study, plus additional recommendations by Higgins (1991) demonstrates the need for a more comprehensive investigation into distribution and taxonomy of Cryptantha compacta. More collections of Cryptantha compacta and dwarf forms of Cryptantha humilis need to be compared in flower and mature fruit.

Penstemon concinnus

In Utah this taxon is restricted to four localities: Tunnel Springs Mountains, Mountain Home Range, Wah-Wah Range, and Burbank Hills (Cronquist et al. 1972). We relocated plants at the Tunnel Springs (Peco-1) and Mountain Home (Peco-2) localities, but population size is small at both locations. We were unable to accurately estimate the population size due to time constraints. I suggest the boundaries of both populations (Peco 1, 2) be



accurately delineated and population size estimated. I also suggest the Burbank Hills and Wah-Wah Mountains locations be comprehensively surveyed and population size and area be quantified. Subsequent surveillance or monitoring can be considered after more is known about population size and threats.

Sphaeralcea caespitosa

We did not find any flowering individuals during the entire survey, although we visited known locations to see if these plants were flowering, we had very little success relocating individuals. If we did locate an individual, it was not flowering. We suspect that plants were grazed very heavily by antelope and domestic sheep and did not flower this year. Sawyer (1991) suggested that utilization cages be used to protect known populations from grazing herbivores. This procedure would rule out the effect of herbivores. It is recommended that utilization cages be considered in 1992 to determine the effects of grazing on the Jones globemallow. It is also recommended that visits to newly discovered populations (Spca 1, 2) be made in June 1992 to positively identify the globemallow and to collect vouchers.

Recommendations for Additional Study of Other Taxa

Recommendations for additional study of the following target taxa are those suggested by the author and the Utah Native Plants Society (UNPS 1991). Future inventory efforts concerning these taxa are rated low, medium, and high priority by the UNPS.



Astragalus uncialis

The inch-high milkvetch status has changed from a category 3c to category 2 because of increased mining activity in the western Great Basin. This taxon should receive medium priority inventory.

Epilobium nevadense

The willowherb remains category 2 and needs medium priority inventory in southwest Utah (Cedar City District, BLM) and Nevada.

Frasera gypsicola

This category 2 species requires high priority inventory in Utah (House Range Resource Area, BLM) and Nevada.

Haplopappus crispus

This category 2 species requires medium priority inventory in the Pine Valley Mountains and adjacent areas.

Jamesia tetrapetala

This category 2 species requires medium priority inventory in Utah and Nevada.

Penstemon angustifolius var. dulcis

This category 2 species requires medium priority inventory in the Little Sahara Sand Dune Recreation Area (House Range Resource Area, BLM) in Juab County.

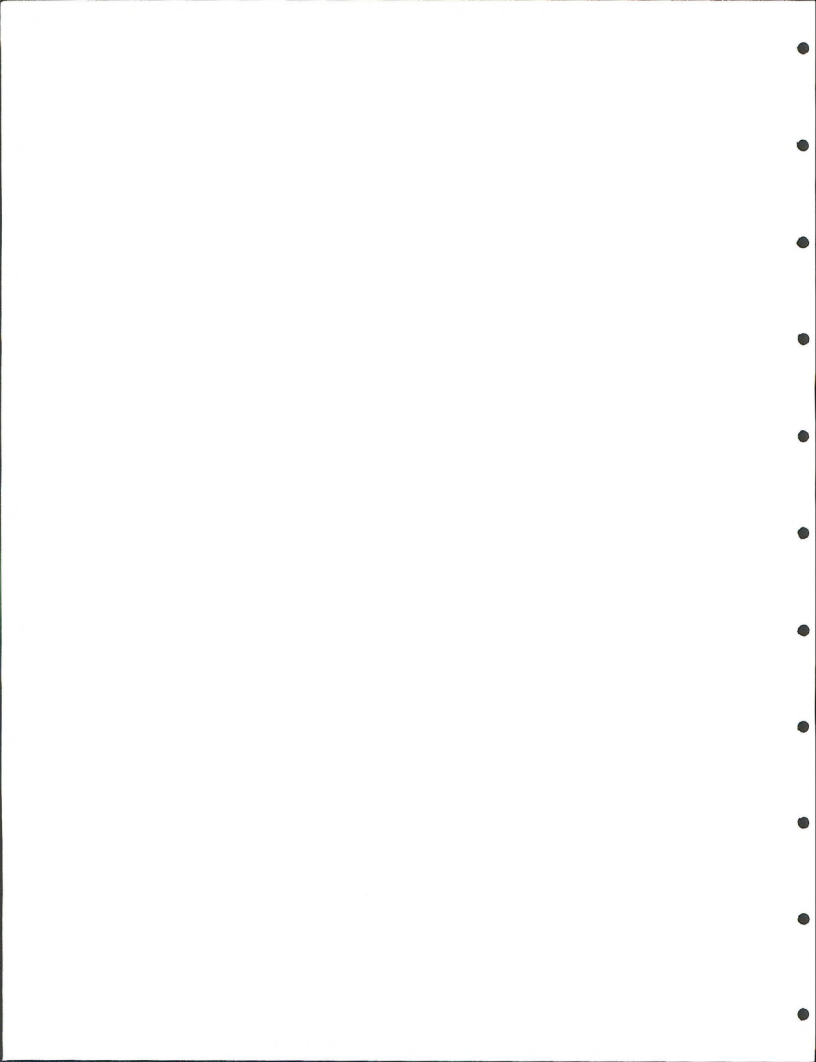
Trifolium andersonii var. friscanum

This category 2 species will be inventoried in 1992 by the U. S. Fish and Wildlife Service and the author.



Additional Inventory in the House Range Resource Area

I concentrated my inventory in the Warm Springs Resource Area where the target taxa were historically reported and worked systematically north into the House Range Resource Area. Coverage of portions of that area was cursory at best. I suggest that portions of the House Range Resource Area that include the Fish Springs Range, North Confusion Range (Disappointment Hills), Thomas Range, and Black Range be surveyed on a more comprehensive basis. It is also recommended that Atriplex canescens var. gigantea be inventoried in the Little Sahara Sand Dune Recreation Area and Hackelia ibapensis be relocated in the Deep Creek Mountains (UNPS 1991).



LITERATURE CITED

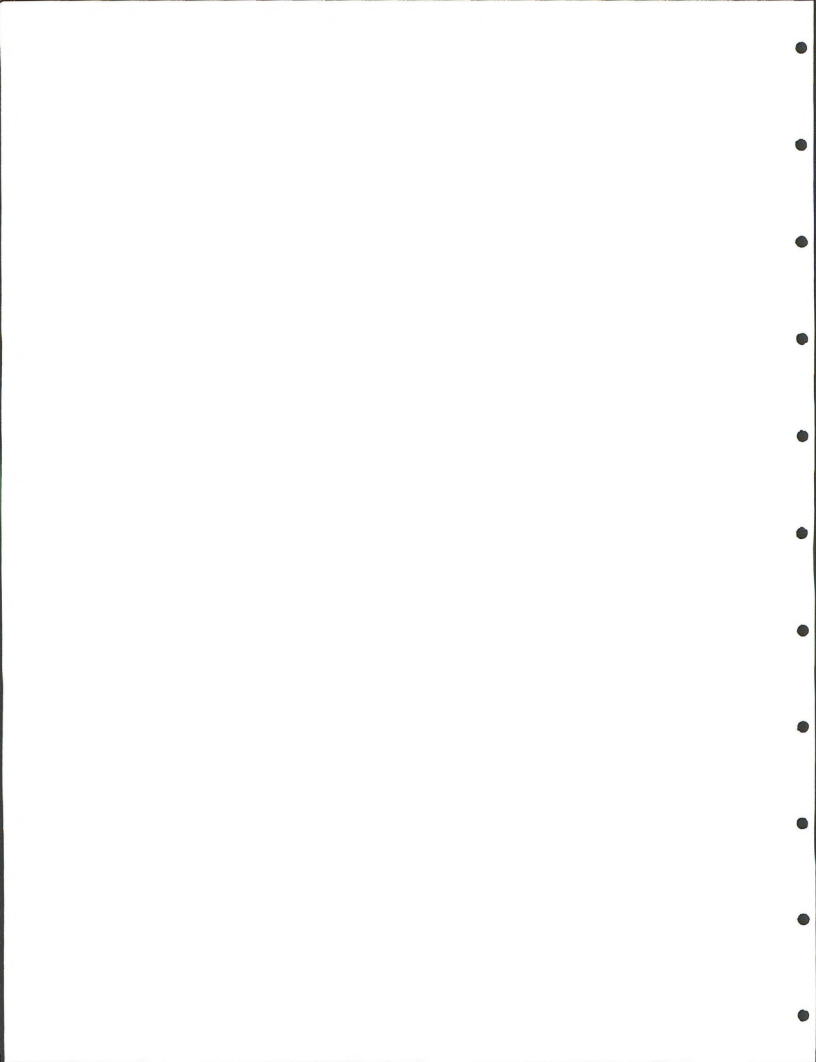
- Bureau of Land Management. 1986. Final Environmental Impact Statement and Proposed Resource Management Plan for the House Range and Warm Springs Resource Areas. Richfield BLM District Office, Richfield, Utah.
- Bureau of Land Management. 1990. Utah BLM Statewide Wilderness Environmental Impact Statement (final). Utah State Office, Bureau of Land Management, Salt Lake City, Utah.
- Cronquist, A., A. H. Holmgren, N. H. Holmgren, and J. L. Reveal. 1972. Intermountain Flora. Vol. 1. Hafner Press. New York, New York.
- Eubank, M. 1979. Utah Weather. Horizon Publishers. Bountiful, Utah. 282 p.
- Franklin, B. 1991. Personal communication. Utah Heritage Program, Salt Lake City, Utah.
- Hanks, K. L. 1962. Geology of the central House Range area. Millard County, Utah. Brigham Young University Geology Studies 9:133-137.
- Higgins, L. 1991. Personal communication. Dixie College. St George, Utah.
- Hintze, L. F. 1988. Geologic history of Utah. Brigham Young University Geology Studies. Special Publication 7. Brigham Young University Press. Provo, Utah. 202 p.
- Holmgren N. H., and P. Holmgren. 1989. A taxonomic study of *Jamesia* (Hydrangeaceae). *Brittonia* 41:348-349.
- Kass, R. J. 1983. A floristic study of the House Range, Millard County, Utah. Unpublished master's thesis. Brigham Young University. Provo, Utah. 75 p.
- Kass, R. J. 1988. A checklist of the vascular plants of the House Range, Utah. *Great Basin Naturalist* 48:102-116.
- Mozingo, H. N., and M. Williams. 1980. Threatened and Endangered Plants of Nevada: An illustrated manual. U.S. Fish and Wildlife Service and Bureau of Land Management. 268 p.
- Neese, E. 1987. Habitat inventory of *Sclerocactus wrightiae* and other associated sensitive species. Final reports to the Bureau of Land Management. Richfield District Office. 116 p.



- Peterson, J. 1991. Personal communication. Utah State Heritage Program. Salt Lake City, Utah.
- Rabinowitz, D. 1981. Seven forms of rarity. In: The biological aspects of rare plant conservation, ed. Hugh Synge. John Wiley & Sons.
- Sawyer, P. 1991. Personal communication. BLM, Richfield District Biologist.
- Soule', M. E., and B. A. Wilcox. 1980. Conservation Biology. Sinauer Associates, Inc., Sunderland, Minnesota.
- Reveal, J. L. 1979. Biogeography of the Intermountain Region: A speculative appraisal. *Mentzelia* 4:71-102.
- UNPS, 1991. Utah Native Plant Society Rare Plants Advisory Committee.
- Welsh, S. L. 1979. Endangered and threatened plants of Utah: A case study. *Great Basin Naturalist Memoirs* 3:69-80.
- Welsh, S. L. 1984. Utah Flora: Polygonaceae. *Great Basin Naturalist* 44:519-557.
- Welsh, S. L., and M. L. Chatterly. 1985. Utah's rare plants revisited. *Great Basin Naturalist* 45:173-236.
- Welsh, S. L. 1986. New taxa in miscellaneous families from Utah. *Great Basin Naturalist* 46:261-264.
- Welsh, S. L., N. D. Atwood, L. C. Higgins, and S. Goodrich. 1987. A Utah Flora. *Great Basin Naturalist Memoirs* 9:1-894.
- West, N. W., F. J. Tausch, K. H. Rea, and P. T. Tueller. 1978. Phytogeographical variation within juniper-pinyon woodland of the Great Basin. *Great Basin Naturalist Memoirs*. 2:119-136.



APPENDIX
Population Habitat Forms



Population Habitat Data Form

Date: 5-20-91

Population Code #: Crco 1-1

Species: *Cryptantha compacta*

Observer: R. Kass

Location: Richfield Dist. BLM

State: Ut. County: Millard

General Locality: Little Horseshoe Canyon

USGS Quad: Big Horseshoe

T.16S, R.17W, S.23, NW4

Other:

Longitude: 113⁰ 43'30"

Latitude: 39⁰ 23'30"

Geologic Feature: Chevron Ridge, Confusion Range

Elevation: 5700 ft

Slope: 0-5%

Exposure: west

Geology & Topography: Barren, white clay outcrops

Edaphics: clay

Insect Visitors: White sulfur butterflies

Comm-Type & Assoc. species: mixed desert shrub, *Artemisia tridentata*, *Ephedra viridis*, *Chrysothamnus vicidiflorus*

Population size: 20 counted

Population area: .25 acre

Age class: mature

Phenology: flower, immature fruit

Threats: Domestic livestock grazing

Comments:

Photos: yes

Voucher #: 3217



Population Habitat Data Form

Date: 5-21-91

Population Code #: Crco 2-1

Species: *Cryptantha compacta*

Observer: R. Kass

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: 1 mile SW of Cowboy Pass

USGS Quad: Big Jensen Pass

T.23S, R.17W, S.19, SW4

Other:

Longitude: 113° 47'30"

Latitude: 38° 47'30"

Geologic Feature: East slope of Burbank Hills

Elevation: 6700 ft Slope: 0-5% Exposure: west

Geology & Topography: Calcareous knolls

Edaphics:

Insect Visitors: none

Comm-Type & Assoc. species: scattered juniper and mixed desert shrub, *Ephedra viridis*, *Artemisia nova*, *Haplopappus acaulis*

Population size: 10 counted

Population area: .25 acre

Age class: mature

Phenology: flower, some fruit

Threats: Domestic livestock grazing

Comments: Need to collect in good fruit

Photos: yes

Voucher #: no

Population Habitat Data Form



Population Habitat Data Form

Date: 5-17-91

Population Code #: Crco 3-1

Species: *Cryptantha compacta*

Observer: R. Kass

Location: Richfield Dist. BLM

State: Ut.

County: Millard

General Locality: about .5 mi SW of Garrison Rd.

USGS Quad: Crystal Peak

T.23S, R.16W, S.24, NE4, SW4

Other:

Longitude: 113° 36'30"

Latitude: 38° 47'30"

Geologic Feature: Crystal Peak

Elevation: 6300 ft

Slope: 0-5%

Exposure: East

Geology & Topography: Rhyolite rock outcrops

Edaphics: gravelly sandy loam

Insect Visitors: none

Comm Type & Assoc. species: pinyon-juniper woodland; *Cercocarpus intricatus*, *Haplopappus acaulis*, *Petrophytum caespitosum*, *Lomatium scabrum*, *Cryptantha humilis*

Population size: 30 counted

Population area: uncertain

Age class: uncertain

Phenology: flower

Threats: none

Comments:

Photos: Yes

Voucher #: 3202



Population Habitat Data Form

Date: 5-8-91

Population Code #: Drka 1-1

Species: *Draba kassii*

Observer: R. Kass

Location: Salt Lake Dist. BLM State: Ut. County: Tooele

General Locality: Deep Creek Mts., Chockcherry Canyon

USGS Quad: Goshute Canyon

T.10S, R.18W, S.3, NE4, NE4

Other:

Longitude: 113° 51' 30"

Latitude: 39° 50' 30"

Geologic Feature: Deep Creek Mountains

Elevation: 6500 ft Slope: 30% Exposure: south

Geology & Topography: Rock outcrops of Prospect Mt. Quartzite

Edaphics: no soil development

Insect Visitors: none

Comm-Type & Assoc. species: pinyon-juniper woodland: *Erigeron tener*, *Heuchera rubescens*, *Lomatium grayii*, *Artemisia ludoviciana*, *Artemisia tridentata*

Population size: 2 counted

Population area: 1 sq. mile

Age class: mature

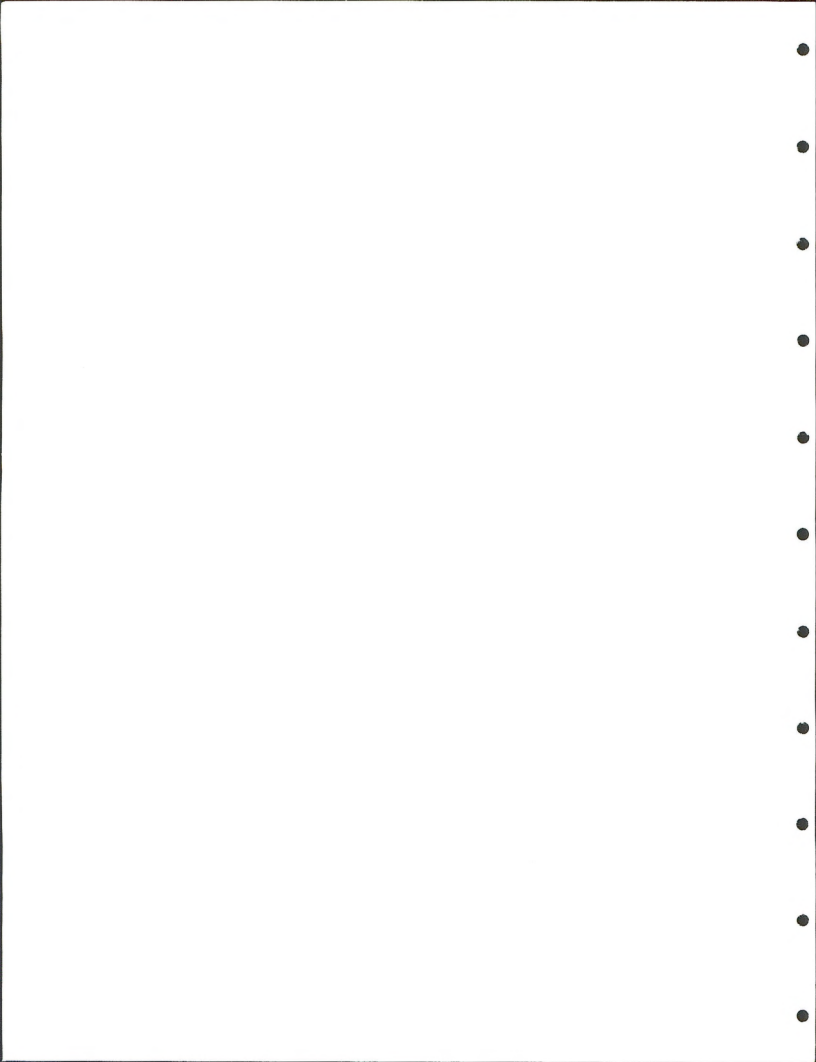
Phenology: flower

Threats:

Comments: northernmost extension of taxon to date.

Photos: yes

Voucher #: no



Population Habitat Data Form

Date: 5-7-91

Population Code #: Drka 1-2

Species: *Draba kassii*

Observer: R. Kass

Location: Salt Lake Dist. BLM State: Ut. County: Tooele

General Locality: Hardscrabble Canyon

USGS Quad: Goshute Canyon T.10S, R.18W, S.14, SE4

Other: Longitude: 113° 51'30' Latitude: 39° 49'30"

Geologic Feature: Deep Creek Mountains

Elevation: 6300 ft Slope: 15% Exposure: west

Geology & Topography: Prospect Mt. quartzite

Edaphics: little soil development Insect Visitors: none

Comm-Type & Assoc. species: pinyon-juniper woodland; *Artemisia tridentata*, *Erigeron tener*, *Lomatium grayii*

Population size: 10 counted Population area : .25 acre

Age class: mature

Phenology: flower

Threats:

Comments:

Photos: yes

Voucher #: no



Population Habitat Data Form

Date: 5-7-91

Population Code #: Drka 1-3

Species: *Draba kassii*

Observer: R. Kass

Location: Salt Lake Dist. BLM

State: Ut. County: Tooele

General Locality: Reilly Canyon

USGS Quad: Goshute Canyon

T.10S, R.18W, S.24, SE4

Other:

Longitude: 113° 52'30"

Latitude: 39° 56'30"

Geologic Feature: Deep Creek Mts.

Elevation: 6600 ft

Slope: 25%

Exposure: southeast

Geology & Topography: Rock outcrops of Prospect Mt. Quartzite

Edaphics: little soil development

Insect Visitors: none

Comm Type & Assoc. species: pinyon-juniper woodland; *Erigeron tener*, *Heuchera rubescens*, *Lomatium grayii*, *Artemisia ludoviciana*

Population size: 50 counted

Population area: .5 sq. mile

Age class: mature

Phenology: Flower & flower bud

Threats: The Eagle Nest Mine is west of this population.

Comments:

Photos: yes

Voucher #: no



Population Habitat Data Form

Date: 5-7-91

Population Code #: Drka 1-4

Species: *Draba kassii*

Observer: R. Kass

Location: Salt Lake Dist. BLM State: Ut. County: Juab

General Locality: mouth of Big Canyon, Basin Creek

USGS Quad: Goshute Canyon

T11S, R18W, S1, SE4, SE4

Other: Longitude: 113⁰ 49'30" Latitude: 39⁰ 53'30"

Geologic Feature: Deep Creek Mountains

Elevation: 5800 ft Slope: 20% Exposure: North

Geology & Topography: rock outcrops of the Prospect Mountain quartzite

Edaphics: little soil development

Insect Visitors: none

Comm-Type & Assoc. species: Pinyon-juniper woodland; *Erigeron tener*, *Heuchera rubescens*, *Lomatium grayii*, *Haplopappus nanus*

Population size: 200 counted

Population area: 1 sq. mile

Age class: all

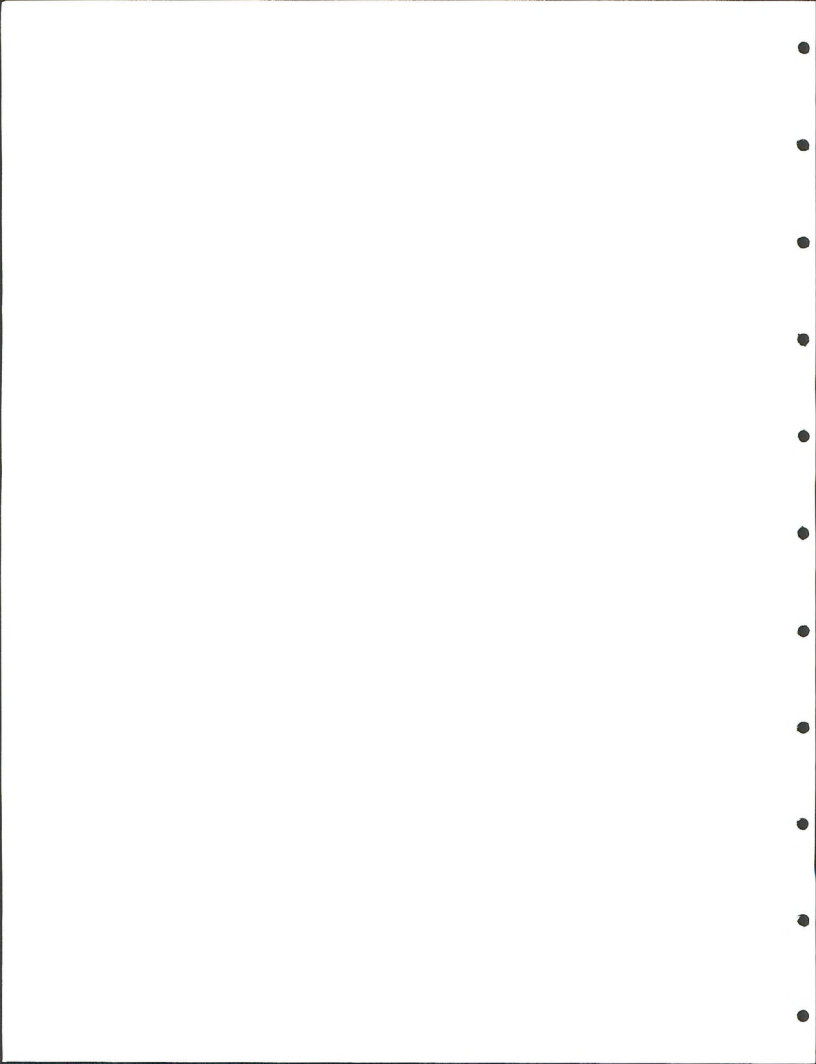
Phenology: flower

Threats:

Comments: Plants growing in shaded crevices of fractured quartzite almost exclusively on N-facing slopes. New Juab County record.

Photos: yes

Voucher #: 3193



Population Habitat Data Form

Date: 9-17-91

Population Code #: Eram 1-1

Species: *Eriogonum ammophilum*

Observer: R. Kass

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: 3 miles east of Sand Pass

USGS Quad: Sand Pass NE

T.14S, R.13W, S.5, SE4

Other:

Longitude: 113° 17'30"

Latitude: 39° 38'30"

Geologic Feature: House Range, Sand Pass

Elevation: 4531 ft

Slope: 0-5%

Exposure: North

Geology & Topography: aeolian sands

Edaphics: sandy

Insect Visitors: none

Comm-Type & Assoc. species: grassland/mixed desert shrub community;
Stipa hymenoides, *Sporobolus airoides*, *Atriplex confertifolia*,
Xanthrocephalum sarothrae

Population size: 10 counted

Population area: uncertain

Age class: uncertain

Phenology: flower

Threats: off road vehicles

Comments: Eram 1-2 in S3,NW4,T14S,13W, same data applies as above
but no collection.

Photos: Yes

Voucher #: 3325



Population Habitat Data Form

Date: 6-7-91

Population Code #: Eram 2-1

Species: *Eriogonum ammophilum*

Observer: R. Kass

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: 0.25 miles N of U.S. Hwy 6-50

USGS Quad: Thompson knolls

T.20S, R.17W, S.11, SE4, SE4

Other: Longitude: 113° 43 30" Latitude: 39° 5'30"

Geologic Feature: Conger Range, Little Valley

Elevation: 5800 ft

Slope: 5%

Exposure: SW

Geology & Topography: Quarternary aeolian sands

Edaphics: sand

Insect Visitors: none

Comm-Type & Assoc. species: Juniper-cliffrose community; *Abronia villosa*, *Eriogonum shockleyi*, *Forsellesia nevadense*, *Cryptantha confertifolia*

Population size: 10 counted

Population area: .25 acre

Age class: uncertain

Phenology: vegetative

Threats: Off road vehicles have destroyed some seedlings at this site.

Comments:

Photos: yes

Voucher #: no



Population Habitat Data Form

Date: 6-3-91

Population Code #: Eram 3-1

Species: *Eriogonum ammophilum*

Observer: G. Carpenter

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: 4 miles NW of Snake Pass

USGS Quad: King Top T.22S,R.16W, S10, NE4, NE4

Other: Longitude: 113° 37'30" Latitude: 38° 55' 30"

Geologic Feature: Confusion Range, Snake Pass Rd.

Elevation: 5600 ft Slope: 5% Exposure: variable

Geology & Topography: Quaternary alluvium and aeolian sands

Edaphics: sand

Insect Visitors: none

Comm-Type & Assoc. species: juniper/mixed desert shrub; *Ephedra viridis*, *Astragalus lentiginosus*, *Sphaeralcea grossulariifolia*, *Sasola kali*, *Abronia villosa*

Population size: 20

Population area: uncertain

Age class: mature

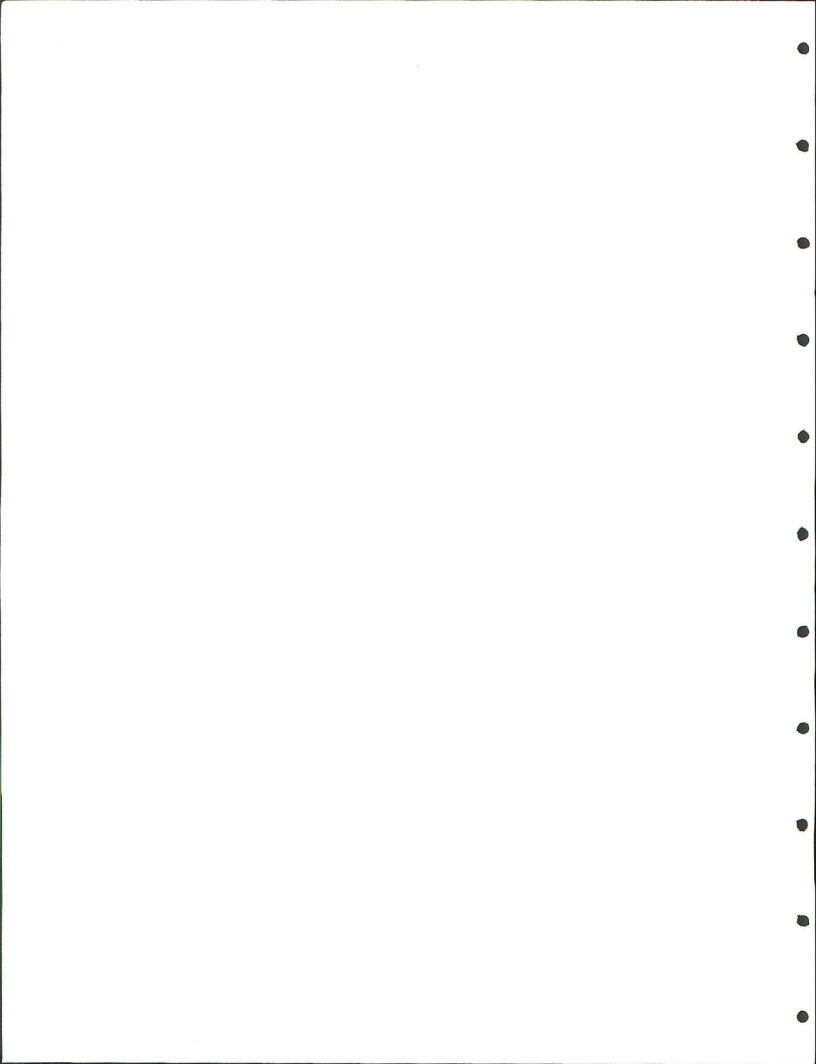
Phenology: vegetative

Threats: cattle trampling

Comments:

Photos: yes

Voucher #: 3239



Population Habitat Data Form

Date: 6-4-91

Population Code #: Eram 3-2

Species: *Eriogonum ammophilum*

Observer: G. Carpenter

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: mouth of Cedar Canyon

USGS Quad: King Top T.22S, R.15W, S.6, NE4, SW4

Other: Longitude: 113° 35'30" Latitude: 38° 56' 30"

Geologic Feature: west side of Confusion Range

Elevation: 6000 ft Slope: 15% Exposure: west

Geology & Topography: aeolian sands

Edaphics: sandy

Insect Visitors:

Comm-Type & Assoc. species: scattered juniper/mixed desert shrub;
Abronia nana, *Astragalus lentiginosus* var. *araneosus*, *Chrysothamnus*
vicidiflorus, *Sasola kali*

Population size: uncertain

Population area: uncertain

Age class: mature

Phenology: vegetative

Threats: some grazing

Comments:

Photos: no

Voucher #: no



Population Habitat Data Form

Date: 6-3-91

Population Code #: Eram 3-3

Species: *Eriogonum ammophilum*

Observer: G. Carpenter

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: Snake Pass Rd. near Snake Pass Reservoir

USGS Quad: Crystal Peak T.22S, R.15W, S33, SW4

Other: Longitude: 113° 32' 30" Latitude: 38° 51' 30"

Geologic Feature: Confusion Range, Snake Pass

Elevation: 6138 ft Slope: 5% Exposure: variable

Geology & Topography: aeolian sands and Quaternary alluvium

Edaphics: sand

Insect Visitors: none

Comm-Type & Assoc. species: juniper and mixed desert shrub;
Chrysothamnus vicidiflorus, *Sphaeralcea grossulariifolia*, *Ephedra viridis*

Population size: uncertain

Population area: uncertain

Age class: mature

Phenology: vegetative

Threats:

Comments: These occurrence are in the same general area (Eram 3-4) T22S, R15W, S35, NW4; (Eram 3-5) T23S, R15W, S3, NE4, SW4. Same habitat data as above for these reported populations. No collections.

Photos: no

Voucher #: no



Population Habitat Data Form

Date: 6-12-91

Population Code #: Eram 3-6

Species: Eriogonum ammophilum

Observer: Geoff Carpenter

Location: BLM, Richfield Dist. State: Ut. County: Millard

General Locality: Sand Wash

USGS Quad: Warm Point

T.23S,R.14W, S.18, SW4

Other: Longitude: 113⁰ 27' 30" Latitude: 38⁰ 46' 30"

Geologic Feature: Confusion Range, Sand Wash

Elevation: 5400 ft. Slope: 5% Exposure: variable

Geology & Topography: aeolian sand and Quaternary alluvium

Edaphics: sandy

Insect Visitors: none

Comm-Type & Assoc. species: mixed-desert shrub

Population size: uncertain

Population area: uncertain

Age class: mature

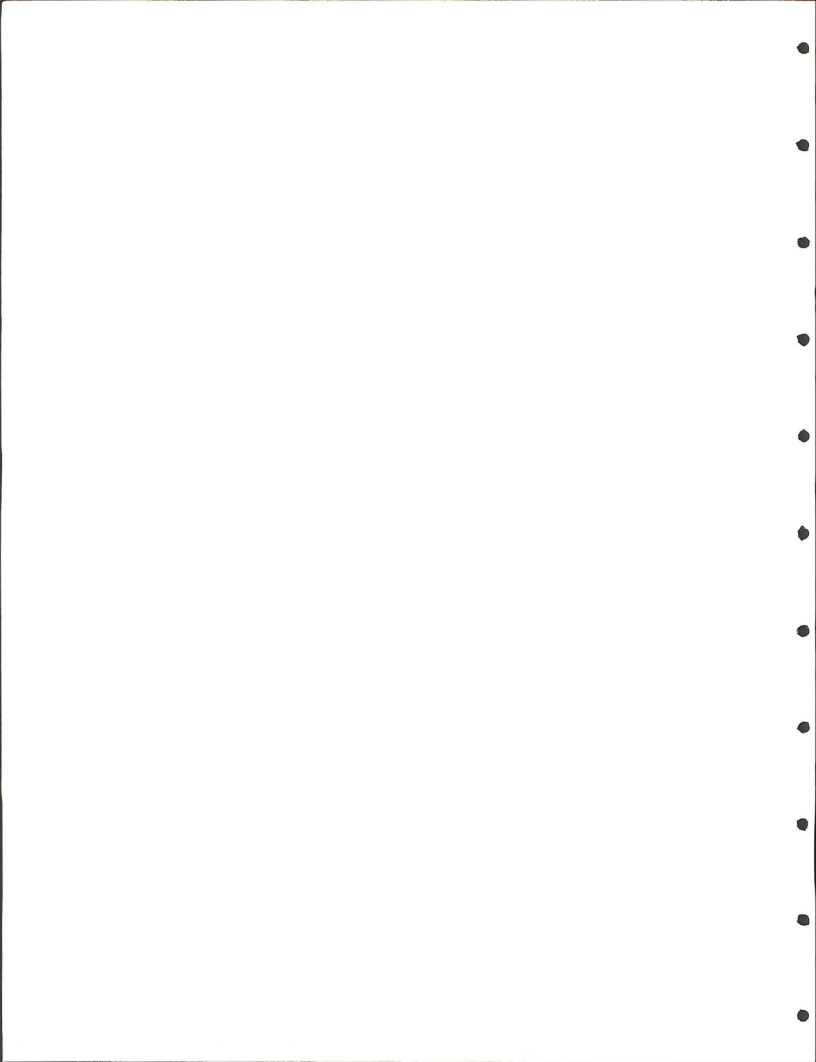
Phenology: vegetative

Threats: none

Comments:

Photos: no

Voucher #: no



Population Habitat Data Form

Date: 6-15-91

Population Code #: Eram 3-7

Species: *Eriogonum ammophilum*

Observer: Geoff Carpenter

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: Blind Valley

USGS Quad: The Barn

T.22S, R.14W, S.6, SW4

Other: Longitude: 113° 27' 30" Latitude: 38° 56' 30"

Geologic Feature: Confusion Range, Blind Valley

Elevation: 5600 ft Slope: 5% Exposure: variable

Geology & Topography: aeolian sands

Edaphics: sandy

Insect Visitors: none

Comm Type & Assoc. species: mixed desert shrub; *Abronia nana*,
Chrysothamnus vicidiflorus, *Juniperus osteosperma*

Population size: 10

Population area: uncertain

Age class: uncertain

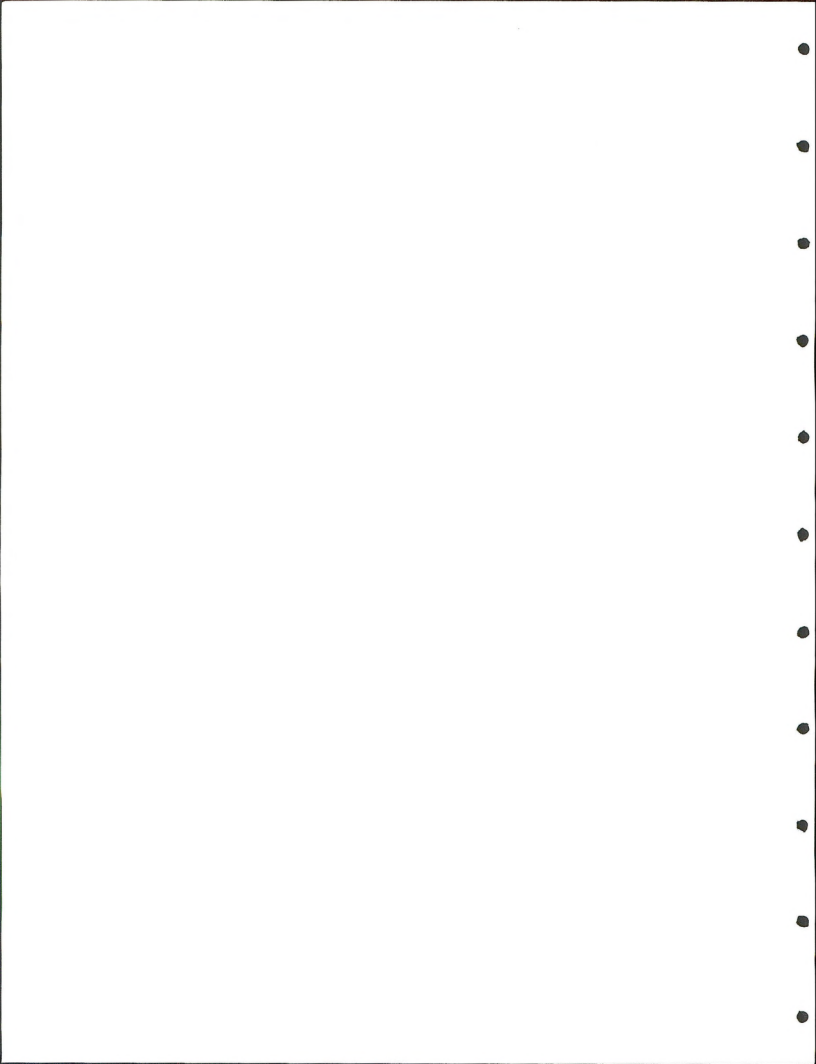
Phenology: vegetative

Threats: none

Comments:

Photos: no

Voucher #: no



Population Habitat Data Form

Date: 6-5-91

Population Code #: Peco 1-1

Species: *Penstemon concinnus*

Observer: G. Carpenter

Location: Richfield Dist. BLM

State: Ut. County: Millard

General Locality: Tunnel Springs Mountains

USGS Quad: Big Jensen Pass

T.24S, R.17W, S.28, NE4

Other:

Longitude: 113° 45'

Latitude: 38° 47'30"

Geologic Feature: Tunnel Springs Mts.

Elevation: 7440 ft

Slope: 15%

Exposure: west

Geology & Topography: Sevy Dolomite, rolling gravelly hillsides

Edaphics: silt loam

Insect Visitors: none

Comm-Type & Assoc. species: Mixed-desert shrub, *Atriplex confertifolia*, *Stipa hymenoides*, *Juniperus oostersperma*, *Chrysothamnus vicidiflorus*, *Elymus elynoides*

Population size: 10 counted

Population area: 3 sq. mi.

Age class: all

Phenology: flower bud and early flower

Threats: Domestic livestock grazing

Comments: Also occurs in T23S,R17W,S32,SE4, (Peco 1-2); same habitat data applies as above but no collection.

Photos: no

Voucher #: no



Population Habitat Data Form

Date: 6-5-91

Population Code #: Peco 1-3

Species: *Penstemon concinnus*

Observer: R. Kass

Location: Richfield Dist. BLM

State: Ut. County: Millard

General Locality: Tunnel Springs

USGS Quad: Big Jensen Pass

T.24S, R.17W, S.8, NE4, SW4

Other:

Longitude: 113⁰ 46'30 Latitude: 38⁰ 39'45"

Geologic Feature: Tunnel Springs Mountains

Elevation: 6822 ft

Slope: 15%

Exposure: west

Geology & Topography: Sevy dolomite

Edaphics: loam

Insect Visitors: none

Comm-Type & Assoc. species: mixed desert shrub and scattered juniper; *Atriplex confertifolia*, *Stipa hymenoides*, *Chrysothamnus vicidiflorus*

Population size: 20 counted

Population area: uncertain

Age class: all

Phenology: flower bud and early flower,

Threats: Domestic livestock grazing

Comments:

Photos: yes

Voucher #: 3241



Population Habitat Data Form

Date: 6-6-91

Population Code #: Peco 2-1

Species: *Penstemon concinnus*

Observer: R. Kass

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: Tunnel Springs

USGS Quad: Big Jensen Pass

T.25S, R.19W, S.26, NW4, SE4

Other:

Longitude: 114° 55'30"

Latitude: 38° 36'30"

Geologic Feature: Tunnel Springs Mountains

Elevation: 6880 ft Slope: 15% Exposure: east

Geology & Topography: Joana limestone

Edaphics: loam

Insect Visitors: none

Comm-Type & Assoc. species: pinyon-juniper community, *Artemisia nova*, *Chrysothamnus vicidiflorus*, *Astragalus calycosus*

Population size: 10 counted

Population area: uncertain

Age class: all

Phenology: flower bud and early flower,

Threats: Domestic livestock grazing

Comments:

Photos: no

Voucher #: no



Population Habitat Data Form

Date: 6-6-91

Population Code #: Peco 2-2

Species: *Penstemon concinnus*

Observer: R. Kass & P. Sawyer

Location: Richfield Dist. BLM

State: Ut. County: Millard

General Locality: Mountain Home Range

USGS Quad: Mt Home Pass

T.25S, R.19W, S.34, NE4,SE4

Other:

Longitude: 114° 57'30"

Latitude: 38° 35'30"

Geologic Feature: Mountain Home Range

Elevation: 7500 ft

Slope: 10%

Exposure: east

Geology & Topography: Joana limestone gravels

Edaphics: silt loam

Insect Visitors: none

Comm-Type & Assoc. species: pinyon-juniper community, *Chrysothamnus vicidiflorus*, *Elymus elyinooides*, *Astragalus calycosus*, *Atremisia nova* and *Ephedra viridis*

Population size: 100 counted

Population area: 10 acres

Age class: all

Phenology: bud and early flower

Threats: Domestic livestock grazing

Comments: Also occurs in T26S,R19W,S3,SE4 (Peco 2-3); same data applies as above but no collection.

Photos:

Voucher #: 3223



Population Habitat Data Form

Date: 6-5-91

Population Code #: Spca 1-1

Species: *Sphaeralcea caespitosa*

Observer: R. Kass

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: The Cove, about 4 mi N of Garrison Rd.

USGS Quad: Mormon Gap T.24S, R.19W, S.32, SE4

Other: Longitude: 114⁰ Latitude: 38⁰ 41'30"

Geologic Feature: Mountain Home Range

Elevation: 6300 ft Slope: 0-5% Exposure: East

Geology & Topography: Sevy dolomite slopes

Edaphics: gravelly sandy loam

Insect Visitors: none

Comm-Type & Assoc. species: grassland/mixed desert shrub community;
Stipa hymenoides, *Sporobolus airoides*, *Atriplex confertifolia*,
Xanthrocephalum sarothrae.

Population size: 2 counted

Population area: uncertain

Age class: uncertain

Phenology: vegetative

Threats: Grazing domestic livestock

Comments: Plants will probably not flower this year due to excessive defoliation by antelope and domestic livestock, Spca 1-2 in T24S, R19W, S34, NE4, NE4; no collection.

Photos: no

Voucher #: no



Population Habitat Data Form

Date: 6-5-91

Population Code #: Spca 1-1

Species: *Sphaeralcea caespitosa*

Observer: R. Kass

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: The Cove, about 4 mi N of Garrison Rd.

USGS Quad: Mormon Gap T.24S, R.19W, S.32, SE4

Other: Longitude: 114⁰ Latitude: 38⁰ 41'30"

Geologic Feature: Mountain Home Range

Elevation: 6300 ft Slope: 0-5% Exposure: East

Geology & Topography: Sevy dolomite slopes

Edaphics: gravelly sandy loam

Insect Visitors: none

Comm-Type & Assoc. species: grassland/mixed desert shrub community;
Stipa hymenoides, *Sporobolus airoides*, *Atriplex confertifolia*,
Xanthrocephalum sarothrae.

Population size: 2 counted

Population area: uncertain

Age class: uncertain

Phenology: vegetative

Threats: Grazing domestic livestock

Comments: Plants will probably not flower this year due to excessive defoliation by antelope and domestic livestock, Spca 1-2 in T24S, R19W, S34, NE4, NE4; no collection.

Photos: no

Voucher #: no



Population Habitat Data Form

Date: 6-6-91

Population Code #: Spca 1-3

Species: *Sphaeralcea caespitosa*

Observer: R. Kass

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: about 7 miles S of Mormon Gap Reservoir

USGS Quad: Mormon Gap

T.25S, R.19W, S.5, NE4, NE4

Other:

Longitude: 114⁰ 57'30"

Latitude: 38⁰ 37'30"

Geologic Feature: Mountain Home Range, east side

Elevation: 7200 ft Slope: 0-5% Exposure: west

Geology & Topography: Sevy dolomite foothills

Edaphics: gravelly silty loam

Insect Visitors: none

Comm-Type & Assoc. species: grassland-matchweed community; *Stipa hymenoides*, *Artemisia nova*, *Atriplex confertifolia*, *Sporobolus airoides*, *Ceratoides lanata*

Population size: 10 counted

Population area: .25 acre

Age class: mature

Phenology: vegetative

Threats: Domestic livestock grazing

Comments: Plants will probably not flower this year due to heavy herbivory by antelope and rabbits.



Population Habitat Data Form

Date: 6-6-91

Population Code #: Spca 1-4

Species: *Sphaeralcea caespitosa*

Observer: R. Kass

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: about 7 miles S of Mormon Gap Reservoir

USGS Quad: Mormon Gap

T.25S, R.19W, S.15, NE4

Other:

Longitude: 114° 57'30"

Latitude: 38° 37'30"

Geologic Feature: Mountain Home Range, east side

Elevation: 7200 ft Slope: 0-5% Exposure: west

Geology & Topography: Sevy dolomite foothills

Edaphics: gravelly silty loam

Insect Visitors: none

Comm Type & Assoc. species: Grassland-matchweed community; *Stipa hymenoides*, *Artemisia nova*, *Atriplex confertifolia*, *Sporobolus airoides*, *Ceratoides lanata*.

Population size: 10 counted

Population area: .25 acre

Age class: mature

Phenology: vegetative

Threats: Domestic livestock grazing

Comments: Plants will probably not flower this year due to heavy herbivory by antelope and rabbits.

Photos: no

Voucher #: no



Population Habitat Data Form

Date: 6-6-91

Population Code #: SPCA 1-5

Species: *Sphaeralcea caespitosa*

Observer: R. Kass

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: about 4 miles NW of Mountain Home Pass

USGS Quad: Mountain Home

T.25S, R.19W, S.19, NE4

Other: Longitude: 114° 57'30" Latitude: 38° 37'30"

Geologic Feature: Mountain Home Range, east side

Elevation: 6300 ft Slope: 0-5% Exposure: west

Geology & Topography: Sevy dolomite foothills

Edaphics: gravelly silt loam

Insect Visitors: none

Comm-Type & Assoc. species: grassland-matchweed community; *Stipa hymenoides*, *Artemisia nova*, *Atriplex confertifolia*, *Sporobolus airoides*, *Ceratoides lanata*

Population size: 10 counted

Population area : .25 acre

Age class: mature

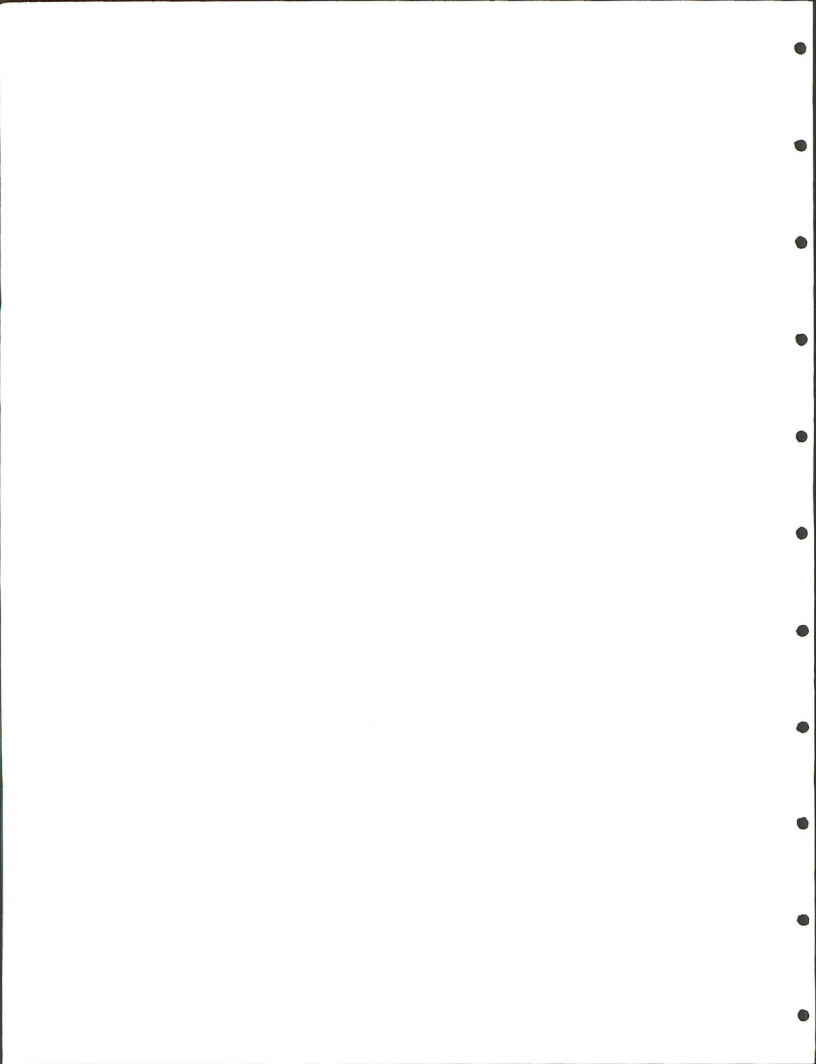
Phenology: vegetative

Threats: Domestic livestock grazing

Comments: Plants will probably not flower this year due to heavy herbivory by antelope and rabbits.

Photos: no

Voucher #: no



Population Habitat Form

Date: 6-5-91

Population Code #: SPCA 1-6

Species: *Sphaeralcea caespitosa*

Observer: R. Kass

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: about 3 miles east of Mountain Home Pass

USGS Quad: Mountain Home Pass

T.24S, R.19W, S.34, SE4

Other:

Longitude: 114° 57'30"

Latitude: 38° 41'30"

Geologic Feature: Mountain Home Range

Elevation: 6300 ft

Slope: 0-5%

Exposure: east

Geology & Topography: Sevy dolomite slopes

Edaphics: gravelly sandy loam

Insect Visitors: none

Comm_Type & Assoc. species: grassland/mixed desert shrub community;
Stipa hymenoides, *Sporobolus airoides*, *Atriplex confertifolia*,
Xanthrocephalum sarothrae.

Population size: 2 counted

Population area: uncertain

Age class: uncertain

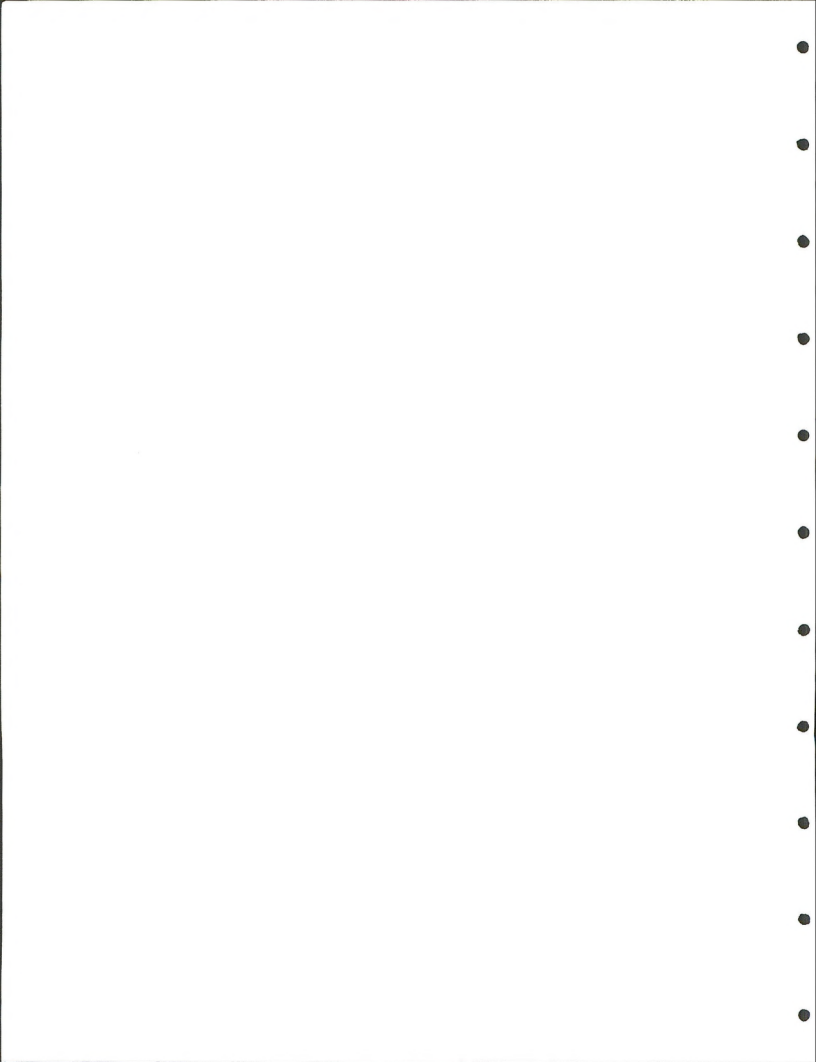
Phenology: vegetative

Threats: Grazing domestic livestock

Comments: Plants will probably not flower this year due to excessive defoliation by antelope and domestic livestock.

Photos: no

Voucher #: no



Population Habitat Data Form

Date: 6-7-91

Population Code #: SPCA 2-1

Species: *Sphaeralcea caespitosa*

Observer: G. Carpenter

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: junction of Black Rock Rd. and Grassy Cove Rd.

USGS Quad: Warm Pt.

T.23S, R.15W, S.36, SW4

Other: Longitude: 113° 25' 30" Latitude: 38° 45' 30"

Geologic Feature: Tule Valley, south end

Elevation: 5240 ft Slope: flat Exposure: variable

Geology & Topography: Quaternary aeolian sands and rhyolite

Edaphics: sandy

Insect Visitors: none

Comm-Type & Assoc. species: mixed-desert shrub; *Ephedra nevadensis*,
Xanthrocephalum sarothrae, *Atriplex confertifolia*, *Hilaria jamesii*

Population size: 2 counted

Population area: .25 acre

Age class: uncertain

Phenology: vegetative

Threats: domestic livestock and grazing antelope

Comments:

Photos: no

Voucher #: no



Population Habitat Data Form

Date: 6-7-91

Population Code #: SPCA 2-2

Species: *Sphaeralcea caespitosa*

Observer: R. Kass

Location: Richfield Dist. BLM State: Ut. County: Millard

General Locality: junction of Black Rock Rd. & Lawson Cove

USGS Quad: Warm Pt.

T.24S, R.14W, S.5, NE4, SW4

Other: Longitude: 113° 27'30"

Latitude: 38° 45'30"

Geologic Feature: South end of Tule Valley

Elevation: 5248 ft

Slope: flat

Exposure: variable

Geology & Topography: Quaternary aeolian sands and rhyolite outcrops

Edaphics: sand

Insect Visitors: none

Comm-Type & Assoc. species: mixed-desert shrub; *Ephedra nevadensis*,
Xanthrocephalum sarothrae, *Atriplex confertifolia*, *Hilaria jamesii*

Population size: 5 counted

Population area: .25 acre

Age class: uncertain

Phenology: vegetative

Threats: domestic livestock

Comments:

Photos: no

Voucher #: no

BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

