

# TECHNICAL NOTE

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USDA - Natural Resources Conservation Service  
Boise, Idaho and Salt Lake City, Utah

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TN PLANT MATERIALS NO. 52

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## THREATENED, ENDANGERED, CANDIDATE & PROPOSED PLANT SPECIES OF UTAH

Derek Tilley, Agronomist, NRCS, Aberdeen, Idaho  
Loren St. John, PMC Team Leader, NRCS, Aberdeen, Idaho  
Dan Ogle, Plant Materials Specialist, NRCS, Boise, Idaho  
Casey Burns, State Biologist, NRCS, Salt Lake City, Utah



Last Chance Townsendia (*Townsendia aprica*). Photo by Megan Robinson.

This technical note identifies the current threatened, endangered, candidate and proposed plant species listed by the U.S.D.I. Fish and Wildlife Service (USDI FWS) in Utah. Review your county list of threatened and endangered species and the Utah Division of Wildlife Resources Conservation Data Center (CDC) GIS T&E database to see if any of these species have been identified in your area of work. Additional information on these listed species can be found on the USDI FWS web site under “endangered species”. Consideration of these species during the planning process and determination of potential impacts related to scheduled work will help in the conservation of these rare plants. Contact your Plant Material Specialist, Plant Materials Center, State Biologist and Area Biologist for additional guidance on identification of these plants and NRCS responsibilities related to the Endangered Species Act.



## Table of Contents

<b>Map of Utah Threatened, Endangered and Candidate Plant Species</b>	4		
 <b>Threatened &amp; Endangered Species Profiles</b>			
<i>Arctomecon humilis</i>	Dwarf Bear-poppy	ARHU3	6
<i>Asclepias welshii</i>	Welsh’s Milkweed	ASWE3	8
<i>Astragalus ampullarioides</i>	Shivwits Milkvetch	ASAM14	10
<i>Astragalus desereticus</i>	Deseret Milkvetch	ASDE2	12
<i>Astragalus holmgreniorum</i>	Holmgren Milkvetch	ASHO5	14
<i>Astragalus limnocharis</i> var. <i>montii</i>	Heliotrope Milkvetch	ASLIM	16
<i>Carex specuicola</i>	Navajo Sedge	CASP9	18
<i>Cycladenia humilis</i> var. <i>jonesii</i>	Jones’ Waxy Dogbane	CYHUJ	20
<i>Glacocarpum suffrutescens</i>	Shrubby Reed-Mustard	GLSU	22
<i>Lepidium barnebyanum</i>	Barneby Ridge-cress	LEBA	24
<i>Lesquerella tumulosa</i> or <i>L. rubicundula</i>	Kodachrome Bladderpod	LERU4	26
<i>Pediocactus despainii</i>	San Rafael Cactus	PEDE17	28
<i>Pediocactus winkleri</i>	Winkler Cactus	PEWI2	30
<i>Phacelia argillacea</i>	Clay Phacelia	PHAR2	32
<i>Primula cusickiana</i> var. <i>maguirei</i>	Maguire Primrose	PRCUM	34
<i>Ranunculus aestivalis</i>	Autumn Buttercup	RAAE	36
<i>Schoenocrambe argillacea</i>	Clay Reed-mustard	SCAR5	38
<i>Schoenocrambe barnebyi</i>	Barneby Reed-mustard	SCBA80	40
<i>Sclerocactus brevispinus</i>	Pariette Cactus	SCGL3	42
<i>Sclerocactus glaucus</i>	Colorado Hookless Cactus	SCGL3	42
<i>Sclerocactus sileri</i>	Siler Pincushion Cactus	SCSI3	44
<i>Sclerocactus wetlandicus</i>	Uinta Basin Hookless Cactus	SCGL3	42
<i>Sclerocactus wrightiae</i>	Wright Fishhook Cactus	SCWR	46
<i>Spiranthes diluvialis</i>	Ute Ladies’ Tresses	SPDI6	48
<i>Townsendia aprica</i>	Last Chance Townsendia	TOAP	51
 <b>Candidate Species Profiles</b>			
<i>Astragalus anserinus</i>	Goose Creek Milkvetch	ASAN7	54
<i>Penstemon scariosus</i> var. <i>albifluvis</i>	White River Penstemon	PESCA	56
<i>Sphaeralcea gierischii</i>	Gierisch Mallow	SPGI2	58
 <b>Proposed Species Profiles</b>			
None			
 <b>Additional Resources</b>			58



# **Threatened and Endangered Species**

# Dwarf Bear Poppy

*Arctomecon humilis* Coville

**Plant Symbol = ARHU3**  
**Listing Status: Endangered**



© Jane Villa-Lobos  
Dwarf bearpoppy (*Arctomecon humilis*). Photo by Jane Villa-Lobos @ USDA-NRCS PLANTS Database.

### Alternate Names

Coville bear-claw poppy  
Common bear poppy  
Low bear-claw poppy

### Uses

There are no known human or wildlife associated uses of dwarf bear poppy.

### Status

Dwarf bear poppy was listed by the USDI Fish and Wildlife Service as an endangered species in 1979 (USDI-FWS 1979). At the time of the listing in 1979 this species was known to exist in only 5 small disjunct populations on very specialized and localized soils. Several factors place dwarf bear poppy in danger of extinction throughout its range. The greatest threat to dwarf bear poppy comes from housing, industrial development and off road vehicle (ORV) use. The area currently occupied by the city of Bloomington, Utah covers approximately one third of dwarf bear poppy's historically known habitat. Strip mining of gypsum deposits in dwarf bear poppy communities also poses a threat to the species. Additional threats come from private collectors taking plants for ornamental and home cultivation. However, the unique soil requirements of the species preclude it from surviving outside of its native range.

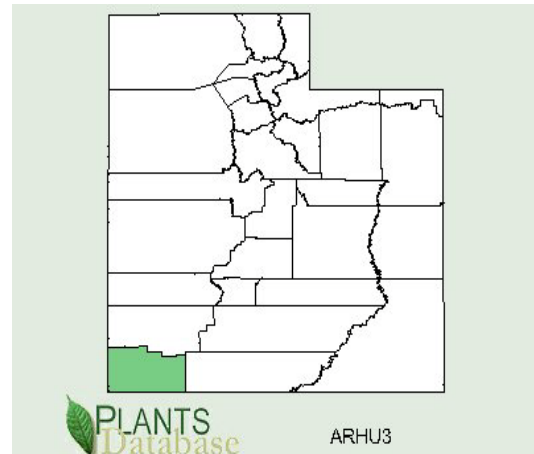
### Description

*General:* Poppy family (Papaveraceae). Dwarf bear poppy is a mound forming perennial forb

arising from an underground woody caudex and long taproot. The leaves are 0.5 to 8 cm (0.2 to 3 in) long and 4 to 16 mm (0.16 to 0.63 in) wide with 3 or 4 lobes or teeth at the tip. Flowers sit atop a 2 to 9 cm (0.8 to 3.5 in) stalk. The petals (4 to 6) are white and 2 to 4 cm (0.8 to 1.5 in) long. The fruit is an egg-shaped capsule filled with shiny black, 2.5 to 3 mm (0.10 to 0.12 in) long seeds (Welsh et al. 2003).

### Distribution:

Dwarf bear poppy is limited in distribution to the St. George area in extreme Southwestern Utah. There are approximately 12 populations within 16 km (10 mi) of St. George with larger populations near Red Bluff, Webb Hill, White Dome, Punchbowl Dome and Atkinville.



Distribution of dwarf bear poppy in Utah

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Dwarf bear poppy is found in mixed warm desert shrub communities from 750 to 1050 m (2,500 to 3,400 ft) elevations (Nelson and Harper 1991). The dominant plant species associated with dwarf bear poppy habitat are Fremont indigo bush (*Psoralea fremontii*), cheesebush (*Hymenoclea salsola*), Mormon tea (*Ephedra torreyana*), shadscale (*Atriplex confertifolia*), shrubby buckwheat (*Eriogonum corymbosum*) and Fremont pepperweed (*Lepidium fremontii*).

### Adaptation

The area in which dwarf bear poppy is found is known as the Dixie Corridor, where the Mohave Desert floristic province meets the Colorado Plateau. The non-alkaline, gypsiferous soils form cryptogamic soil crusts, which exclude most

plant species. The result is a region of “badlands” with low rolling hills and sparse vegetation (USDI FWS 1985). Dwarf bear poppy is restricted in range to areas with gypsum substrates derived from the Shnabkaib Member of the Moenkopi Formation (Nelson and Harper 1991).

#### **Establishment**

Due to the restricted range and specific habitat requirements of dwarf bear poppy, it has proven difficult to transplant and establish (USDI-FWS 1985). No known propagation protocols are available.

#### **Management**

Management for dwarf bear poppy is focused on habitat preservation. The expansion and development of St. George and surrounding communities poses the greatest threat to the species. Existing populations should be protected against further development and other land use that disturbs the sensitive soil surface.

Direct effects of off road vehicle use to individual plants may be limited to severe; however destruction of the cryptogamic crusts and the resulting soil erosion significantly impacts the limited suitable habitat available for dwarf bear poppy (Nelson and Harper 1991). Moreover, soil erosion also has an adverse affect

on the seed bank from which dwarf bear poppy can reestablish populations.

Collection for landscape use has been noted as a threat to dwarf bear poppy (USDI-FWS 1979), but little evidence of collecting has been seen at the known populations (USDI-FWS 1985).

#### **References**

- Nelson, D.R., Harper, K.T. 1991. Site characteristics and habitat requirements of the endangered dwarf bear-claw poppy (*Arctomecon humilis* Coville, Papaveraceae). Great Basin Naturalist 51(2): 167-175.
- USDA, NRCS. 2010. The PLANTS Database (<http://plants.usda.gov>, 13 April 2010). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
- USDI Fish and Wildlife Service. 1979. Endangered and threatened wildlife and plants: rule to determine *Arctomecon humilis* is an endangered species. Federal Register. 44 (216): 64250-64252.
- USDI Fish and Wildlife Service. 1985. Dwarf bear-poppy (*Arctomecon humilis* Coville) recovery plan. U.S. Fish and Wildlife Service, Denver, CO. 36 pp.
- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.



## Welsh's Milkweed

*Asclepias welshii* N.H. Holmgren & P.K. Holmgren

Plant Symbol = ASWE3  
Listing Status: Threatened



Welsh's milkweed (*Asclepias welshii*). Photo by J.P. Riser, Washington State University

### Uses

There are no known human uses of Welsh's milkweed. This species, unlike other members of the genus, is not toxic to livestock. However larger animals tend to avoid the unconsolidated sands that make up Welsh's milkweed habitat, leaving it largely unutilized by grazers.

### Status

Welsh's milkweed was listed as a threatened species in 1987 with designated critical habitat (USDI-FWS, 1987).

### Description

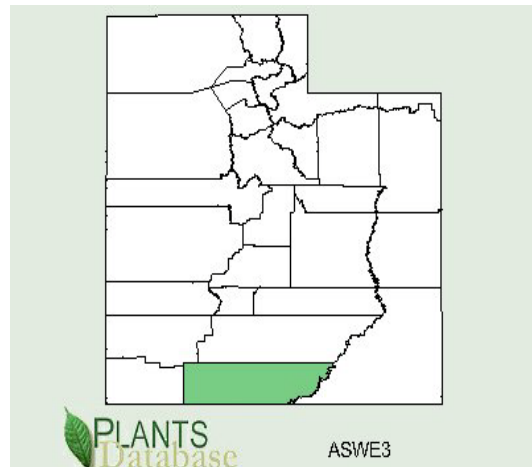
*General:* Milkweed family (Asclepiadaceae). Welsh's milkweed is a perennial forb which grows from an extensive underground root system comprised of a taproot and horizontal runners connecting stem clusters. The plants grow with one to several erect stems to a height of 25 to 100 cm (10 to 39 in). The leaves are opposite, and broadly ovate; 6 to 9 cm (2.3 to 3.5 in) long, and 3 to 6 cm (1.2 to 2.3 in) wide (Welsh et al., 2003). The leaves and stems are covered with a white woolly tomentum, or pubescence, early in the season. Windblown sands abrade the hairs leaving the vegetation nearly glabrous later in the year. The inflorescence is a globose cluster of around 30 cream colored flowers with a rose-tinged middle.

The fruit is a 4 to 8 cm (1.6 to 3.2 in) long pod or follicle. The seeds are large, 2 cm (1 in) long with a rudimentary coma, or tuft of hairs (USDI-FWS, 1992).



Welsh's milkweed inflorescence. Photo by S. O'Kane

### Distribution:



Distribution of Welsh's milkweed in Utah

Welsh's milkweed is currently known to occur in three populations in southern Utah and northern Arizona. The largest population of an estimated 10,000 plants lies on the Coral Pink Sand Dunes in Kane County, Utah. A second Utah population of approximately 500 individuals is found in the Sand Hills, also in Kane County. A third population of approximately 500 plants is known at Sand Cove on the Kane County, Utah and Coconino County, Arizona border.

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.



*Habitat:*

Welsh's milkweed is found on shifting sands and dunes adjacent to sagebrush, juniper and ponderosa pine communities from 1,700 to 1,900 m (5,600 to 6,200 ft) in elevation. Other dune-loving plant species found in association with Welsh's milkweed include blowout grass (*Redfieldia flexuosa*), sand dropseed (*Sporobolus cryptandrus*), Indian ricegrass (*Achnatherum hymenoides*) and giant dunegrass (*Calamovilfa gigantea*).

**Adaptation**

Welsh's milkweed is adapted to aeolian sands on active dunes in the arid deserts of southern Utah and northern Arizona. Mean annual precipitation in nearby Kanab, Utah is reported at 38 cm (15 in).

**Management**

The primary threats to Welsh's milkweed involve potential habitat loss and habitat damage due to off road vehicle (ORV) use (USDI-FWS, 1992). However; Welsh (2003) observed the species thriving despite the utilization of dunes for recreation, because OHV users tend to avoid vegetated areas. Management strategies in place include regulating OHV use, monitoring known populations, and inventorying suitable habitat.

**Seeds and Plant Production**

Flowering occurs from May to June with seed set and dispersal occurring from July to September (USDI-FWS, 1992). Several potential pollinators that have been observed visiting Welsh's milkweed include bees, wasps, and butterflies. One species of carpenter bee (*Xylocopa californica* ssp. *arizonensis*) and one species of bumble bee (*Bombus bifarius*) have been observed carrying milkweed pollen (USDI-FWS, 1992).

**References**

USDI- Fish and Wildlife Service. 1987. Endangered and threatened wildlife and plants; final rule determining *Asclepias welshii* (Welsh's milkweed) to be a threatened species with critical habitat. In: Federal Register. 52(208): 41435-41441.

USDI- Fish and Wildlife Service. 1992. Welsh's milkweed (*Asclepias welshii*) recovery plan. U.S. Fish and Wildlife Service, Denver, Colorado. 19pp.

Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.

## Shivwits milkvetch

*Astragalus ampullarioides* (S.L. Welsh)

S.L. Welsh

**Plant Symbol = ASAM14**

**Listing Status: Endangered**



Shivwits milkvetch (*Astragalus ampullarioides*). USDI Fish and Wildlife Service

### Alternate Names

*Astragalus eremiticus*

*A. eremiticus* var. *ampullarioides*

### Uses

Shivwits milkvetch is highly palatable to domestic livestock (USDI-FWS, 2006a). The plants have also been observed being grazed by deer, often consuming the entire inflorescence (Welsh, 2003). There are no known human uses of the species.

### Status

Shivwits milkvetch was listed as endangered in 2001 due to its rarity and declining populations (USDI-FWS, 2001), and in 2006, the USDI Fish and Wildlife Service designated approximately 2,151 acres as critical habitat (USDI-FWS, 2006b).

### Description

**General:** Legume family (Fabaceae). Shivwits milkvetch is a perennial forb growing 20 to 65 cm (8 to 26 in) tall from a branching subterranean root crown. The stems are spreading to erect, bearing pinnately compound leaves, 5 to 22 cm (2 to 9 in) long with 13 to 21 leaflets. The leaflets are 4 to 24 mm (0.16 to 1.0 in) long, and 3 to 15 mm (0.12 to 0.59 in) wide. The inflorescence is a raceme with 20 to 45 cream yellow colored flowers. The flowers are

14 to 18 mm (0.55 to 0.71 in) long. The fruit is an elliptical, inflated pod, 12 to 18 mm (0.47 to 0.71 in) long, and 8 to 10 mm (0.31 to 0.39 in) thick (Welsh et al., 2003).

### Distribution:

There are six known populations of Shivwits milkvetch distributed across a limited range. All known populations occur within Washington County, Utah, ranging from Pahcoon Spring Wash, approximately 18 km (11 mi) northwest of St. George to Rockeville, Utah, approximately 64 km (40 mi) to the east of the Pahcoon Spring Wash population (USDI-FWS, 2006a).

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Shivwits milkvetch grows in the Mojave Desert in creosote (*Larrea tridentata*) and Utah juniper (*Juniperus osteosperma*) plant communities with other warm desert shrubs.

### Adaptation

Shivwits milkvetch is restricted to isolated pockets of gypsiferous soils of the Chinle formation from 900 to 1350 m (3,000 to 4,360 ft) in elevation in an area receiving an average of 16.5 cm (6.5 in) of annual precipitation (WRCC, 2011).

### Management

The major threats to Shivwits milkvetch involve habitat loss as a result of human disturbance. Urban and commercial development surrounding the St. George area, including the creation of roads, power transmission lines, and water pipelines, have significantly impacted milkvetch habitat. Off-road vehicle (ORV) use and cattle grazing and trampling continue to threaten Shivwits milkvetch. The clay soils creating Shivwits milkvetch habitat lack stability and are easily disturbed. Fencing of USDI-BLM managed populations will reduce ORV and cattle impacts. A further threat comes from the increase in fire frequency due to invasive non-native grasses such as cheatgrass (*Bromus tectorum*) and red brome (*Bromus rubens*) (USDI-FWS, 2006a).

The current recovery plan for Shivwits milkvetch includes fire and fuels management including a 1.2 km (0.75 mi) buffer zone surrounding known populations. Signs and fencing have also been installed at several of the population sites to

reduce ORV, cattle, and human trampling (USDI-FWS, 2006a).

### **Pests and Potential Problems**

Herbivory from livestock, deer and rabbits are a concern for this species. Additionally, aphid infestations and infestations of white moths have been documented (USDI-FWS, 2006a). It is unknown what, if any, impacts these pests have on the fecundity of the plants.

### **Seed and Plant Production**

Flowering occurs from April to May, with each plant bearing approximately 90 flowers. Shivwits milkvetch can be fertilized via pollinators or through self-fertilization; however, studies indicate that self-fertilized fruit bear significantly less seed than insect pollinated flowers (Tepedino, 2005). Several native bees have been observed pollinating Shivwits milkvetch including: *Anthophora coptognatha*, *A. dammersi*, *Eucera quadricinata*, *Bombus morrisoni*, *Osmia clarescens*, *O. marginata*, and *O. titusi*. Pollination by European honeybees (*Apis mellifera*) has also been documented (Tepedino, 2005). No horticultural propagation information is available.

### **References**

Tepedino, V.J. 2005. Final report: reproduction and pollination of two rare species of

*Astragalus* from Washington County, Southern Utah: *A. holmgreniorum* and *A. ampullarioides*. USDA-ARS Bee Biology and Systematics laboratory, Department of Biology, Utah State University, Logan, Utah. 19p.

- USDI-Fish and Wildlife Service. 2001. Endangered and threatened wildlife and plants; determination of endangered status for *Astragalus holmgreniorum* (Holmgren milkvetch) and *Astragalus ampullarioides* (Shivwits milkvetch). In: Federal Register 66 (189): 49560-49567.
- USDI-Fish and Wildlife Service. 2006. *Astragalus holmgreniorum* (Holmgren milkvetch) and *Astragalus ampullarioides* (Shivwits milkvetch) recovery plan. U.S. fish and Wildlife Service, Denver, Colorado. 106p.
- USDI-Fish and Wildlife Service. 2006. Critical habitat designated for two endangered plants. U.S. fish and Wildlife Service. Lakewood, Colorado. 3p.
- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.
- Western Regional Climate Center. 2010. Online. <http://www.wrcc.dri.edu/index.html>. Accessed January 10, 2010.

## Deseret Milkvetch

*Astragalus desereticus* Barneby

**Plant Symbol = ASDE2**

**Listing Status: Threatened**



Deseret milkvetch (*Astragalus desereticus*). Photo from Center for Plant Conservation (2010)

### Uses

There are no known human uses of Deseret milkvetch. This species appears to be non toxic to cattle, and though not considered primary forage, it may be inadvertently grazed along with other food sources (USDI-FWS, 1999).

### Status

Deseret milkvetch was considered extinct for decades until its rediscovery in 1981. It is known from a single population in Utah County, Utah. Deseret milkvetch was listed in 1999 by the Fish and Wildlife Service as threatened (USDI-FWS, 1999). In 2007, the Fish and Wildlife Service gave advanced notice of intention to remove Deseret milkvetch from the list of endangered and threatened plants in the near future (USDI-FWS, 2007). It was determined that previous threats were not as significant as once believed, and that the species is not likely to become in danger of extinction throughout all or a significant portion of its range in the foreseeable future. Surveys conducted in 2006 indicated that the known population had increased by 31 percent since the time of listing (USDI-FWS, 2007).

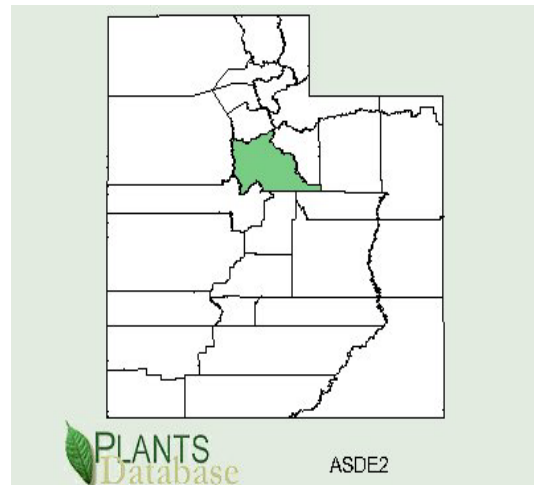
### Description

*General:* Legume family (Fabaceae). Deseret milkvetch is a short-lived perennial forb rising from a subterranean caudex. The leaves are 4 to 12 cm (1.6 to 4.7 in) long with 11 to 17 leaflets, each being 2 to 14 mm (0.08 to 0.6 in) long and 1.5 to 8 mm (0.06 to 0.3 in) wide. The leaves and

stems are hairy. The inflorescence is a 5 to 10 flowered raceme. The flowers are whitish with pale purple wings and a purple-tipped keel. The fruit is a densely hairy, curved, oval pod, 10 to 20 mm (0.4 to 0.8 in) long and 5 to 10 mm (0.2 to 0.4 in) thick (Welsh et al., 2003).

### Distribution:

Deseret milkvetch is known from a single location in Utah County, Utah in the Thistle Creek watershed east of Birdseye, Utah. The total occupied area covers approximately 345 acres (USDI-FWS, 2007).



Distribution map of Deseret milkvetch

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Desert milkvetch is restricted to steep, sandy, west and south facing slopes of the Moroni Formation at elevations from 1,645 to 1,700 m (5,400 to 5,600 ft). The associated vegetation is an open pinyon-juniper community with sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), Indian ricegrass (*Achnatherum hymenoides*) and needle-and-thread (*Stipa comata*).

### Adaptation

This species is endemic to sandy-gravelly soils weathered from conglomerate outcrops of the Moroni Formation (USDI-FWS, 2007). The mean annual precipitation for the population is 30 to 35 cm (12 to 14 in) (Western Regional Climate Center, 2010).

### **Management**

This species was listed as threatened due to its restricted population size and several potential threats to its habitat. Those threats included rural development, cattle grazing and impacts to pollinator habitat. Since listing, the population has grown considerably and the threats do not appear as significant as earlier believed.

Approximately 67 percent of the species' range is managed by the Utah Department of Wildlife Resources as part of the Northwest Manti Wildlife Management Area. UTDWR management provides protection against anticipated threats, thus mitigating concern for the species.

### **Seeds and Plant Production**

Deseret milkvetch flowers and sets seed in May and June. Its primary pollinators are believed to be bumblebees or other pollen generalist bee species (CPC, 2010).

### **References**

Center for Plant Conservation. 2010. Online.  
<http://www.centerforplantconservation.org/>.  
Accessed 28 December, 2010.

- USDI- Fish and Wildlife Service. 1999.  
Endangered and threatened wildlife and plants; final rule to list *Astragalus desereticus* (Deseret milkvetch) as threatened. In: Federal Register. 64(202): 56590-56596.
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Endangered and threatened wildlife and plants; anticipated delisting of *Astragalus desereticus* (Deseret milkvetch) from the list of endangered and threatened plants; prudency determination for designation of critical habitat. In: Federal Register. 72(16): 3379-3382.
- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.
- Western Regional Climate Center. 2010. Online.  
<http://www.wrcc.dri.edu/index.html>.  
Accessed 28 December, 2010.

# Holmgren milkvetch

*Astragalus holmgreniorum* Barneby

**Plant Symbol = ASHO5**  
**Listing Status: Endangered**



Holmgren milkvetch (*Astragalus holmgreniorum*). Photo by R. Van Buren

**Alternate Names**  
Paradox milkvetch

### Uses

There are no known human uses of the species. The flowers are visited by numerous native solitary nesting bees (Tepedino, 2005).

### Status

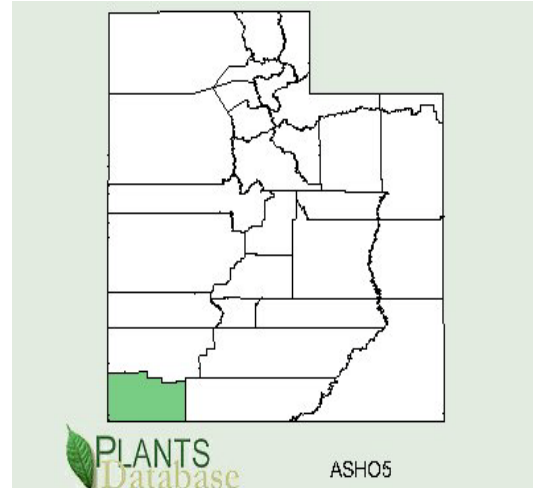
Holmgren milkvetch was listed as endangered in 2001 due to its rarity and declining populations (USDI-FWS, 2001). In 2006, approximately 6,289 acres were designated by the USDI Fish and Wildlife Service as critical habitat (USDI-FWS, 2006b).

### Description

**General:** Legume family (Fabaceae). Holmgren milkvetch is a short-lived perennial forb. It grows to a height of 4 to 12 cm (1.6 to 4.7 in) arising from a thickened taproot and root crown. It has pinnately compound leaves 4 to 22 cm (1.6 to 8.7 in) long with 5 to 23 broadly oval leaflets, 6 to 16 mm (0.24 to 0.63 in) long and 3.5 to 12 mm (0.14 to 0.47 in) wide. The inflorescence is a 4 to 16 flowered raceme. The pink-purple flowers are 18 to 24 mm (0.71 to 0.94 in) long, and produce claw-shaped elliptic pods, 2.5 to 5.5 cm (0.9 to 2.2 in) long and 6 to 9 mm (0.2 to 0.4 in) thick. In cross-section, the pods have a triangular outline. Each pod contains 30 to 34 seeds (Welsh et al., 2003).

### Distribution:

There are six known populations of Holmgren milkvetch, all located within 16 km (10 mi) of St. George, Utah. Three are in Washington County, Utah and two straddle the border of Washington County, Utah and Mojave County, Arizona. Approximately one half of the Holmgren milkvetch habitat is managed by the State of Utah.



Distribution of Holmgren milkvetch in Utah

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Holmgren milkvetch occurs in the Mojave Desert ecoregion in creosotebush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*) and mixed desert scrub plant communities. Its native habitat is sparsely vegetated with less than 20 percent living cover (Van Buren and Harper, 2003). Other native plant species in association with Holmgren milkvetch include desert goldenhead (*Acamptopappus sphaerocephalus*), Nevada jointfir (*Ephedra nevadensis*), Torrey's jointfir (*E. torreyana*), threadleaf snakeweed (*Gutierrezia microcephala*), and big galleta (*Hilaria rigida*) (Van Buren and Harper, 2003).

### Adaptation

Holmgren milkvetch is endemic to the badlands of the Santa Clara and Virgin River drainages from 756 to 914 m (2,480 to 3,000 ft) in elevation. The plants are restricted to the Virgin Limestone Member, Schnabkaib Member and Upper Red Member of the Moenkopi Formation, and sporadically on the Chinle Shale Formation



(USDI-FWS, 2006a). Soils are very gravelly or very cobbly sandy loams with 3 to 40% slopes in an area receiving an average of 16.5 cm (6.5 in) of annual precipitation (WRCC, 2011).

### Management

The greatest threat to Holmgren milkvetch is habitat loss due to urban expansion. Many of the known populations exist in areas targeted for development. Designation of critical habitat and BLM land trades can potentially ameliorate some of these threats; however development of new surface roads, power transmission lines, and water pipelines pose further challenges. Habitat fragmentation caused by these developments can additionally have a negative impact on pollination and genetic interchange (USDI-FWS, 2006a).

Habitat degradation caused by off road vehicle (ORV) use and cattle trampling continues to threaten Holmgren milkvetch. ORV use in Utah increased 437% in Washington County, Utah from 1998 to 2006 (USDI-FWS, 2006a). ORVs and cattle can damage plants and destroy soil properties necessary for Holmgren milkvetch habitat. All known Holmgren milkvetch populations are currently under threat from ORV use.

The explosive increase in invasive weeds could potentially have a drastic effect upon Holmgren milkvetch habitat. Invasive annual grasses such as cheatgrass (*Bromus tectorum*) and red brome (*B. rubens*) can grow in densities sufficient to carry fires throughout the limited habitat and can cause permanent changes in the plant community (USDI-FWS, 2006a).

### Seed and Plant Production

Holmgren milkvetch exhibits low survival in the first growing season with few plants surviving into their second year (Van Buren and Harper, 2003). Flowering occurs between March and April with fruit set by the end of April. Seed pods are visible through May before the plants senesce for the summer (Van Buren and Harper, 2003a). The flowers are pollinated primarily by native bee species including: *Anthophora poterae*, *Eucera quadricincta*, *Osmia titusi* and two *Dialictus* species (Tepedino, 2005). Pollinated fruit contain on average 25 seeds (Stubben, 1997).

### References

- Stubben, D. 1997. Habitat characteristics of *Astragalus holmgreniorum* Barneby and genetic variation among two rare milkvetches in southwestern Utah. Unpublished Master's Thesis. Brigham Young University. Provo, Utah. 59p.
- Tepedino, V.J. 2005. Final report: reproduction and pollination of two rare species of *Astragalus* from Washington County, Southern Utah: *A. holmgreniorum* and *A. ampullarioides*. USDA-ARS Bee Biology and Systematics laboratory, Department of Biology, Utah State University, Logan, Utah. 19p.
- USDI-Fish and Wildlife Service. 2001. Endangered and threatened wildlife and plants; determination of endangered status for *Astragalus holmgreniorum* (Holmgren milkvetch) and *Astragalus ampullarioides* (Shivwits milkvetch). In: Federal Register 66 (189): 49560-49567.
- USDI-Fish and Wildlife Service. 2006. *Astragalus holmgreniorum* (Holmgren milkvetch) and *Astragalus ampullarioides* (Shivwits milkvetch) recovery plan. U.S. fish and Wildlife Service, Denver, Colorado. 106p.
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- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.
- Western Regional Climate Center. 2010. Online. <http://www.wrcc.dri.edu/index.html>. Accessed January 10, 2010.



## Heliotrope Milkvetch

*Astragalus limnocharis* Barneby var. *montii* (S.L. Welsh) Isley

**Plant Symbol = ASLIM**  
**Listing Status: Threatened**



Heliotrope milkvetch (*Astragalus limnocharis* var. *montii*).  
Photo by Duane Atwood

### Uses

There are no known human uses of heliotrope milkvetch. Sheep are known to graze the leaves and stems.

### Status

Heliotrope milkvetch was listed as a threatened species with critical habitat in 1987 (USDI-FWS, 1987). It is considered a species with a low degree of threat and a low recovery potential.

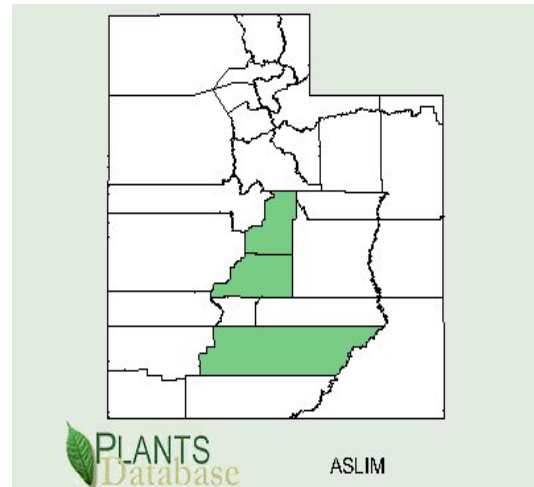
### Description

*General:* Legume family (Fabaceae). Heliotrope milkvetch is a low growing perennial forb. The leaves are pinnately compound with 5 to 13 leaflets; each 2 to 8 mm (0.08 to 0.3 in) long and 1 to 2 mm (0.04 to 0.08 in) wide. The stems and leaves have basally fixed hairs; the leaves are glabrous above and hairy on the underside. Two to 8 flowers are born in a loose raceme. The flowers are pinkish purple with white tips on the wing petals. The fruit is an oval shaped, inflated pod, 11 to 18 mm (0.4 to 0.7 in) long and 8 to 12 mm (0.3 to 0.5 in) wide, mottled with pinkish brown freckles (Welsh et al., 2003).

### Distribution:

Heliotrope milkvetch is known from three populations in Sanpete and Sevier Counties, Utah. All populations are located within the boundaries of the Manti-Lasal National Forest. Two populations occur on Heliotrope Mountain

and the third is located on White Mountain. In total, the three populations cover an estimated 390 acres and comprise approximately 200,000 individuals (USDI-FWS, 1995).



Distribution map of heliotrope milkvetch

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Heliotrope milkvetch grows in the subalpine zone from 3,200 to 3,350 m. (10,500 to 11,000 ft) in shale barrens of the Flagstaff Limestone formation. It can be found at timberline on plateaus and openings in spruce-fir forests growing with other alpine, mat-forming species.

### Adaptation

This species is adapted to windswept plateaus at timberline in the Flagstaff Limestone formation. Average precipitation on the plateaus ranges from 76 to 90 cm (30 to 35 in).

### Management

The primary threat to heliotrope milkvetch comes from oil and gas exploration and development. The species occurs in an area with potential for oil and gas development. Any habitat disturbance from oil and gas exploration could have a significant negative impact on the survival of the species.

Limited sheep grazing occurs in heliotrope milkvetch habitat; however negative impacts to the populations from the current grazing levels have not been observed (USDI-FWS, 1995).

### Seeds and Plant Production

Plants flower immediately after winter snow melt in mid-June. The species can self pollinate, but is primarily an outcrosser. The flowers are pollinated by multiple species of mason bees (*Osmia* spp.) (Greer et al., 1995).

### References

Greer, S.M., Tepedino, V.J., Griswold, T.L. and W.R. Bowlin. 1995. Pollinator sharing by three sympatric milkvetches, including the endangered species *Astragalus montii*. Great Basin Naturalist. 55(1): 19-28.

USDI- Fish and Wildlife Service. 1987. Endangered and threatened wildlife and

plants; final rule to determine *Astragalus montii* (Heliotrope milkvetch) to be threatened species, with designation of critical habitat). In: Federal Register. 52(215): 42652-42657.

USDI-FWS. 1995. Heliotrope milkvetch (*Astragalus montii*) recovery plan. U.S. Fish and Wildlife Service. Denver, Colorado. 11pp.

Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.

## Navajo Sedge

*Carex specuicola* J.T. Howell

**Plant Symbol = CASP9**

**Listing Status: Threatened**



Navajo sedge (*Carex specuicola*). Photo by Daniela Roth, Navajo National Heritage Project

### Alternate Names

None

### Uses

There are no known human uses of Navajo sedge. The leaves are grazed by domestic livestock.

### Status

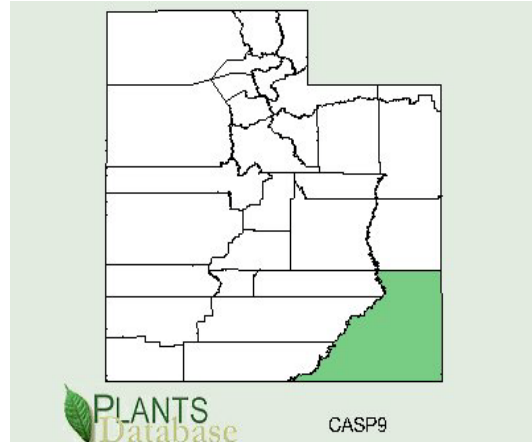
Navajo sedge was listed by the USDI Fish and Wildlife Service as a threatened species in 1985, and was assigned critical habitat (USDI-FWS, 1985).

### Description

**General:** Sedge family (Cyperaceae). Navajo sedge is a perennial, grass-like sedge. The plants form bunches from 25 to 45 cm (10 to 18 in) tall with long, slender, pale green leaves, 1 to 2 mm (0.04 to 0.08 in) wide and 12 to 20 cm (5 to 8 in) long. The stems are triangular in cross section, and end in 2 to 4 floral spikes. The terminal spike contains both male and female flowers, with the female flowers situated above the male. The fruit is an achene borne within a perigynium (a sack-like appendage). This species is unusual in that it has two types of female flowers, those with two-branched styles and lenticular (lens shaped) achenes, and those with three-branched styles and triangular achenes (USDI-FWS, 1987).

### Distribution:

Navajo sedge exists on lands managed by the Navajo Nation in Coconino, Apache and Navajo Counties, Arizona, and in adjacent San Juan County Utah. The range of Navajo sedge includes the Navajo Creek drainage to the Tsegi Canyon Watershed (CPC, 2011).



Distribution of Navajo sedge in Utah

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:



Navajo sedge habitat. Photo by Daniela Roth, NNHP

Navajo sedge occurs in shaded seeps, springs, and hanging gardens in the pink-red Navajo Sandstone Formation from 1,400 to 2,200 m (4,600 to 7,200 ft) in elevation (Roth, 2008). Mean annual precipitation for the area is 19 cm (7.5 in). Navajo sedge occurs with other hanging garden and wetland/riparian species such as monkey flower (*Mimulus eastwoodiae*), helleborine (*Epipactus gigantea*), water bentgrass (*Agrostis semiverticillata*), and common reed (*Phragmites communis*) (USDI-FWS, 1987).

### **Management**

Populations occupying low-lying accessible habitat are vulnerable to domestic livestock grazing. Horses, sheep, goats and cattle are believed to graze the plants. Off-road vehicles could also negatively impact Navajo sedge habitat. Water development for wells, troughs and capture basins for livestock have resulted in increased grazing in populated areas (USDI-FWS, 1987).

The recovery plan for Navajo sedge covers the protection of known habitats and populations, inventories of potential habitat, and the reintroduction of plants into additional sites (USDI-FWS, 1987).

### **Seed and Plant Production**

Though this species is known to produce seed, the majority of reproduction appears to be

vegetative (USDI-FWS, 1987). No propagation information is available.

### **References**

- Center for Plant Conservation. 2011. Plant profile for *Carex specuicola*. Online at: <http://www.centerforplantconservation.org>. Accessed January 7, 2011.
- Roth, D. 2008. Species account for *Carex specuicola*. Navajo Natural Heritage Program. Window Rock, AZ. 2p.
- USDI-Fish and Wildlife Service. 1985. Endangered and threatened wildlife and plants; determination of *Carex specuicola* to be a threatened species with critical habitat. In: Federal Register 50 (89): 19370-19374.
- USDI-Fish and Wildlife Service. 1987. Navajo sedge recovery plan. U.S. Fish and Wildlife Service. Albuquerque, New Mexico. 39p.

## Jones' Waxy Dogbane

*Cycladenia humilis* Benth. var. *jonesii*  
(Eastw.) S.L. Welsh & N.D. Atwood

**Plant Symbol = CYHUJ**  
**Listing Status: Threatened**



Jones' waxy dogbane (*Cycladenia humilis* var. *jonesii*).  
Photo from USDI-NPS

### Alternate Names

*Cycladenia jonesii*  
*Jones' cycladenia*

### Uses

There are no known uses associated with Jones' waxy dogbane.

### Status

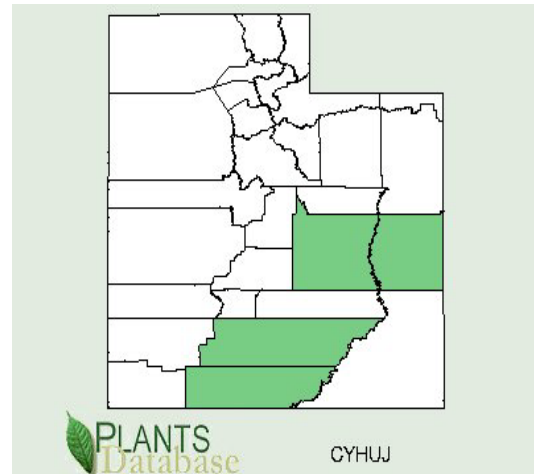
Jones' waxy dogbane was listed as a threatened species by the USDI Fish and Wildlife Service in 1986 (USDI-FWS, 1986). In 2008 the USDI FWS published a recovery outline assigning Jones' waxy dogbane a priority of 12C, moderate threat to a subspecies (USDI-FWS, 2008).

### Description

*General:* Primrose family (Primulaceae). Jones' waxy dogbane is a long lived herbaceous perennial forb. At maturity, plants are 10 to 15 cm (4 to 6 in) tall with wide, oval or elliptical leaves. The flowers are trumpet shaped, whitish pink to purple, and somewhat resemble morning glory flowers. The plant forms an underground woody crown extending to a deep taproot. The plants are clonal and may spread via rhizomes and stolons (Sipes and Wolf, 1997; Wolf et al., 1992).

### Distribution:

Jones' waxy dogbane has been found in Emery, Grand, Garfield and Kane Counties Utah and in Mohave County, Arizona.



Distribution map of Jones' waxy dogbane

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Jones' waxy dogbane grows in arid sites at 1,300 to 1,800 m (4,300 to 6,000 ft) elevation in desert scrub and juniper plant communities receiving 6 to 9 inches of mean annual precipitation.

### Adaptation

This species is endemic to gypsiferous, saline soils of the Cutler, Summerville, and Chinle geologic formations. It is adapted to the arid desert scrub environment due to its deep taproot (Welsh et al., 2003).

### Management

Jones' waxy dogbane has extremely limited fruiting and seed set. No seedling germination has been observed in multiple surveys. It is believed that the species has a complex pollination system and that suitable pollinators may have been lost (Sipes and Tepidino, 1996). Lack of recruitment puts this species at serious risk to habitat disturbances. The major threats to Jones' waxy dogbane habitat are off-road vehicle (ORV) use, and oil, gas, and mineral exploration. Additional threats include mountain biking and livestock grazing. It has recently been determined that Jones' waxy dogbane is genetically similar to California populations of *Cycladenia humilis* and has therefore been recommended for delisting (Last, 2009).

### Seeds and Plant Production

Jones' waxy dogbane has not been observed to produce viable germinants. Natural seed set is limited and forced pollination has mostly resulted in aborted fruit.

### References

- Last, M.P. 2009. Intraspecific phylogeography of *Cycladenia humilis* (Apocynaceae). Unpublished master's thesis. BYU. Provo, Utah.
- Sipes, S.D. and V.J. Tepedino. 1996. Pollinator lost? Reproduction by the enigmatic Jones' cycladenia, *Cycladenia humilis* var. *jonesii* (Apocynaceae). In: Southwestern rare and endangered plants: proceedings of the second conference. Flagstaff, Arizona. Gen. Tech. Rep. RM-GTR-283. Fort Collins, Colorado.
- Sipes, S.D. and P.G. Wolf. 1997. Clonal structure and patterns of allozyme diversity in the rare endemic *Cycladenia humilis* var. *jonesii* (Apocynaceae). American Journal of Botany. 84(3): 401-409.
- USDI- Fish and Wildlife Service. 1983. Endangered and threatened wildlife and plants; rule to determine *Cycladenia humilis* var. *jonesii* (Jones cycladenia) to be a threatened species. Federal Register. 51(86): 16526-16530.
- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.
- Wolf, P.G., Sipes, S.D. and V.J. Tepedino. 1992. Population genetics of *Cycladenia humilis* var. *jonesii*. BLM.



# Shrubby Reed-Mustard

*Glaucocarpum suffrutescens* (Rollins)  
Rollins

Plant Symbol = GLSU  
Listing Status: Endangered



Uinta Basin waxfruit (*Glaucocarpum suffrutescens*).  
Photo by V. Tepedino

## Alternate Names

Shrubby reed-mustard  
Toad-flax cress  
Uinta Basin waxfruit  
*Hesperidanthus suffrutescens*  
*Schoenocrambe suffrutescens*

## Uses

Uinta Basin waxfruit is grazed by rabbits, horses, sheep and cattle (USDI-FWS, 1987).

## Status

Uinta Basin waxfruit was listed as an endangered species in 1987 due to its restricted range and number of individuals, and its vulnerability to habitat disturbance (USDI-FWS, 1987). At that time, it was proposed to designate critical habitat for the species. The proposal was however withdrawn, because it was believed that designated critical habitat would expose the population to a significant risk of vandalism (USDI-FWS, 1987).

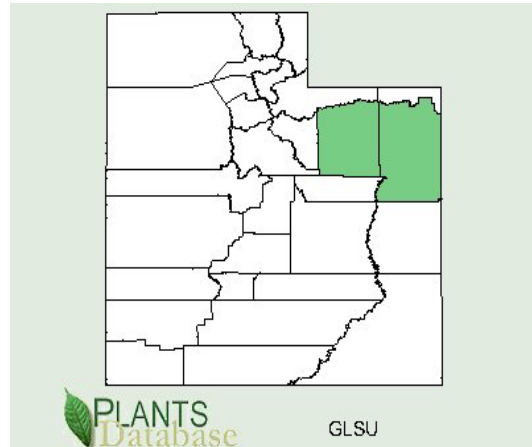
This species has also been treated historically as a member of the genera *Schoenocrambe* and *Thelypodium*; however, Al-Shehbaz (2005), and subsequently, the Flora of North America, combined *Glaucocarpum*, and much of *Schoenocrambe* into the larger genus *Hesperidanthus*. This change has not yet been

adopted by the PLANTS database or USDI Fish and Wildlife Service.

## Description

*General:* Mustard family (Brassicaceae). Uinta Basin waxfruit is a perennial subshrub with multiple stems arising from a woody caudex. The plants grow to a height of 10 to 35 cm (4 to 14 in). It has sessile or petiolate leaves with a smooth margin, 10 to 25 mm (0.39 to 1.0 in) long and 3 to 10 mm (0.12 to 0.39 in) wide. The inflorescence is a raceme with 5 to 20 yellow four-petaled flowers, with petals 7 to 11 mm (0.28 to 0.43 in) long. The fruit is a silique (a lengthened pod), 10 to 20 mm (0.39 to 0.79 in) long by 1.2 to 2.5 mm (0.05 to 0.10 in) thick. The seeds are 1.5 to 1.9 mm (0.06 to 0.07 in) long by 0.9 to 1.3 mm (0.4 to 0.5 in) thick.

## Distribution:



Distribution of Uinta Basin waxfruit

There are three known populations of Uinta Basin waxfruit. The Gray Knolls population sits between the Green River and Hill Creek in Uintah County, Utah, and contains approximately 1,000 plants in three stands. The second population is on Little Pack Mountain and Big Pack Mountain between Hill Creek and Willow Creek in Uintah County, Utah and is comprised of approximately 3,000 plants in six stands. The third population is in Duchesne County, Utah at the base of the Bad Lands Cliff with approximately 1,000 scattered plants. The lands occupied by Uinta Basin waxfruit are managed by the USID-BLM, the Uintah and Ouray Reservation of the Ute Indian Tribe, and the Naval Oil Shale Reserve No. 2 administered by the Department of Energy (USDI-FWS, 1994).



For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

**Habitat:**

Uinta Basin waxfruit occurs in desert shrub communities with interspersed pinyon (*Pinus edulis*) and juniper (*Juniperus osteosperma*). The dominant species of the habitat include shadscale (*Atriplex confertifolia*), pygmy sagebrush (*Artemisia pygmaea*), mountain mahogany (*Cercocarpus montanus*), Salina widlrye (*Elymus salina*) and jointfir (*Ephedra* spp.). Several local endemics grow in this unique habitat (USDI-FWS, 1994; Welsh et al., 2003).



Uinta Basin waxfruit habitat. Photo by J.S. Peterson, USDA-PLANTS database

**Adaptation**

Uinta Basin waxfruit is endemic to the Green River Formation, a highly erodible calcareous shale stratum (USDI-FWS, 1994). This species occurs from 1,645 to 1,830 m (5,400 to 6,000 ft) in a 15 to 23 cm (6 to 9 in) precipitation zone (WRCC, 2011).

**Management**

Existing threats to Uinta Basin waxfruit include oil and gas exploration, oil-shale mining, stone quarrying, and off-road vehicle (ORV) use. All known populations are found on Federal lands leased for oil and gas energy reserves. Additionally, this species' range is underlain by oil shale, which may be mined when economic conditions for oil extractions become favorable (USID-FWS, 1994).

Management goals include the establishment of a minimum of 5 separate populations consisting of 2,000 or more individuals per population. This is to be accomplished by controlling the habitat threatening activities listed above, and by identifying suitable habitat for additional

populations and introducing propagated materials (USDI-FWS, 1994).

**Pests and Potential Problems**

Historical sheep and cattle grazing use may have impacted Uinta Basin waxfruit on USDI-BLM lands. However current grazing levels are not believed to pose a serious threat (USDI-FWS, 1994).

**Seed and Plant Production**

Flowering occurs from April to May with fruit ripening in May to June. Individual flowers bloom for 3 to 5 days. Uinta Basin waxfruit is capable of self-pollination, but significantly more seed is produced via cross-pollination. Numerous native, solitary, ground nesting bees have been identified foraging in Uinta Basin waxfruit including *Dialictus perdificilis*, *D. sedi*, *Evyllaes pulveris*, and *Andrena walleyi* (USDI-FWS, 1994). There has been limited success with propagation attempts (CPC, 2011).

**References**

Al-Shehbaz, I. A. 2005. *Hesperidanthus* (Brassicaceae) revisited. Harvard Pap. Bot. 10: 47-51.

Center for Plant Conservation. 2011. Plant profile for *Glaucocarpum suffrutescens*. Online at: <http://www.centerforplantconservation.org>. Accessed January 13, 2011.

USDI- Fish and Wildlife Service. 1987. Endangered and threatened wildlife and plants; final rule to determine *Glaucocarpum suffrutescens* (Toad-flax cress) to be an endangered species. In: Federal Register. 52(193): 37416-37420.

USDI-Fish and Wildlife Service. 1994. Utah reed-mustards; clay reed-mustard (*Schoenocrambe argillacea*), Barneby reed-mustard (*Schoenocrambe barnebyi*), shrubby reed-mustard (*Schoenocrambe suffrutescens*) recovery plan. Denver, Colorado. 22p.

Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.

Western Regional Climate Center. 2011. Online. <http://www.wrcc.dri.edu/index.html>. Accessed January 13, 2011.

## Barneby Ridge-Cress

*Lepidium barnebyanum* Reveal

**Plant Symbol = LEBA**  
**Listing Status: Endangered**



Barneby ridge-cress (*Lepidium barnebyanum*). Photo by Ben Franklin, Courtesy of Utah DNR

### Alternate Names

*Lepidium montanum* ssp. *demissum* Hitchcock  
Barneby pepper cress  
Ridgecress

### Uses

There are no known human uses of Barneby ridge-cress.

### Status

Barneby ridge-cress was listed as an endangered species by the USDI Fish and Wildlife Service in 1990 (USDI-FWS, 1990). It is restricted to a single population in Duchesne County, Utah comprised of three disjunct stands. It is considered a species with a high degree of threat and a low recovery potential for which there are conflicts with economic activities (USDI-FWS, 1993).

### Description

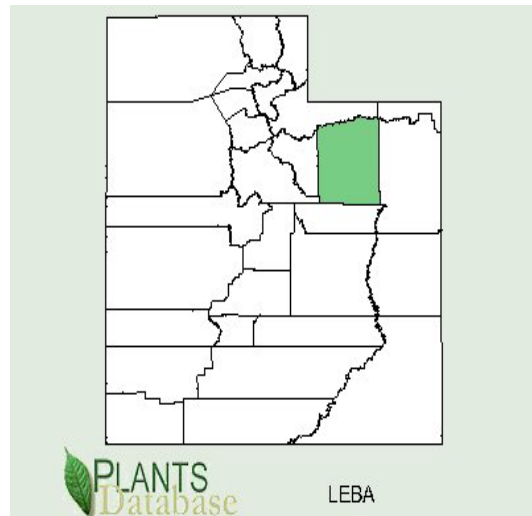
**General:** Mustard family (Brassicaceae). Barneby ridge-cress is a pulvinate-caespitose (mound forming) perennial forb arising from a thickened branched woody taproot. The plants grow 7 to 12 cm (3 to 5 in) tall and forms clumps or cushions up to 20 cm (8 in) across. The stems are smooth or minutely hairy. The leaves are narrow, 1 to 6.5 cm (0.4 to 2.5 in) long and 1 to 3 mm (0.04 to 0.12 in) wide. The flowers are small, four-petaled, with white petals 3.5 to 4 mm (0.14 to 0.16 in) long. The fruit is a silicle (an oval pod),

3 to 6 mm (0.12 to 0.24 in) long and 3 to 4 mm (0.12 to 0.16 in) wide (Welsh et al., 2003).

### Distribution:

Barneby ridge-cress is endemic to Indian Canyon Drainage in Duchesne County, Utah approximately 5 km (3 mi) south of Starvation Reservoir. The single population contains approximately 5,000 individuals and covers nearly 500 acres (CPC, 2011). All known stands exist on the Ouray Reservation of the Ute Indian Tribe (USDI-FWS, 1993).

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.



Distribution map of Barneby ridge-cress

### Habitat:

Barneby ridge-cress grows on a series of marly shale barrens on three ridgelines on either side of Indian Creek. The habitat for Barneby ridge-cress occurs in pockets in pinyon-juniper woodlands. Barneby ridge-cress grows in close association with other mound forming species including stemless woollybase (*Hymenoxys acaulis*), plateau Townsendia (*Townsendia mensana*), Hooker's sandwort (*Arenaria hookeri*), and low feverfew (*Parthenium ligulatum*).

### Adaptation

Barneby ridge-cress is endemic to marly shale barrens derived from the Uinta and Green River Formations in a 10 to 14 inch precipitation area. These shale barrens form pockets or islands of suitable habitat surrounded by unsuitable soils (USDI-FWS, 1993).

### **Management**

Threats to Barneby ridge-cress include off-road vehicle damage and oil and gas development. The entire population is currently located in an established oil and gas field (USDI-FWS, 1993). Short term management objectives include preventing extinction and continued habitat degradation by maintaining and protecting the existing population. Long term goals include conducting inventories of suitable habitat to better determine the species distribution, and establishing new stands if suitable habitat is located (USDI-FWS, 1993).

### **Seed and Plant Production**

Reproduction of Barneby ridge-cress is sexual. The flowers bloom in April and May and fruiting occurs in late May through June. Pollinators are unknown.

### **References**

- Center for Plant Conservation. 2011. Plant profile for *Lepidium barnebyanum*. Online at: <http://www.centerforplantconservation.org>. Accessed January 7, 2011.
- USDI-Fish and Wildlife Service. 1990. Endangered and threatened wildlife and plants; endangered status for the plant *Lepidium barnebyanum* (Barneby ridge-cress). In: Federal Register 55(189): 39860-39864.
- USDI-Fish and Wildlife Service. 1993. Barneby ridge-cress (*Lepidium barnebyanum*) recovery plan. U.S. Fish and Wildlife Service, Denver, Colorado. 14 pp.
- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.

## Breaks Bladderpod

*Lesquerella rubicundula* Rollins

or

## Kodachrome Bladderpod

*Lesquerella tumulosa* (Barneby)

Reveal

Plant Symbol = LERU4

Listing Status: Endangered



Kodachrome bladderpod (*Lesquerella tumulosa*). USDI FWS (2010).

### Alternate Names

*L. hitchcockii* ssp. *tumulosa*

*L. rubicundula*

*Physaria tumulosa*

*P. rubicundula* var. *tumulosa*

Tum bladderpod

### Uses

There are no known human or wildlife associated uses associated with Kodachrome bladderpod.

### Taxonomy

Kodachrome bladderpod was originally described as *L. hitchcockii* ssp. *tumulosa* by Barneby (1966). It was later elevated to species status by Reveal (1970), and in 1973, Rollins and Shaw placed *L. tumulosa* in *L. rubicundula*. More recently, Welsh and others have followed Al-Shbaz and O'Kane (2002) in placing *Lesquerella* in the genus *Physaria*, but have assigned Kodachrome bladderpod varietal status within *P. rubicundula* creating the new *P. rubicundula* var. *tumulosa* (2003). The PLANTS Database (2010) currently follows Rollins (1993) and places *L. tumulosa* within *L. rubicundula*. Publication of the anticipated volume 7 of Flora North America may create

further changes or could greatly help in settling the matter.

The previously mentioned taxonomic changes may have significant implications for this taxon's status as an endangered species. *Lesquerella rubicundula* and *L. hitchcockii* are both limited to a small area in Utah and Nevada, but neither is as restricted in area as *L. tumulosa*. Therefore if *L. tumulosa* is synonymized with *L. rubicundula* or *L. hitchcockii*, it would likely not be considered to be endangered.

### Status

Kodachrome bladderpod was officially listed as an endangered species in 1993 (USDI FWS). There is currently no comprehensive recovery plan created for the species, but a revised recovery outline is being used until a final recovery plan has been approved (USDI FWS 2009).

### Description

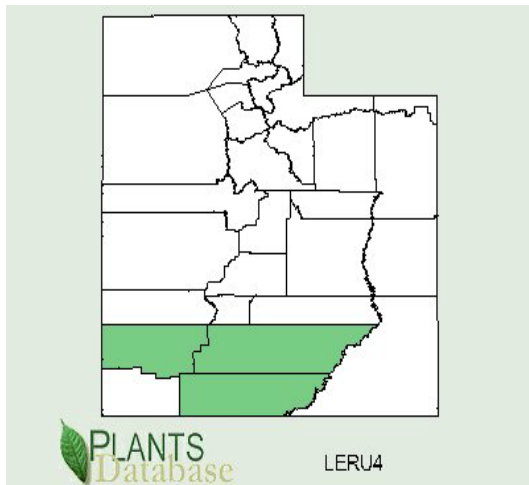
*General:* Mustard family (Brassicaceae or Cruciferae). Kodachrome bladderpod is a small, perennial mound forming forb reaching approximately 4 cm tall. The leaves are stemless, 3 to 12 mm (0.1 to 0.5 in) long and 1 to 2 mm (0.04 to 0.08 in) wide with stellate (star-like) hairs. The flowers have four yellow petals from 5 to 7 mm (0.2 to 0.3 in) in length (Welsh et al. 2003). The fruit is an egg-shaped silicle (capsule) approximately 3 to 5 mm (0.1 to 0.2 in) long containing 4 to 8 seeds. According to Welsh et al. (2003) *L. tumulosa* differs from *L. rubicundula* in being densely pulvinate caespitose (very tightly mound forming) and having smaller styles, averaging 1.5 to 2.8 mm (0.06 to 0.11 in) versus 2.8 to 5.5 mm (0.11 to 0.22 in) for *L. rubicundula*.

### Distribution:

Kodachrome bladderpod is endemic to white, semibarren shale knolls in Kane County, Utah. There is a single known population of scattered occurrence in the Kodachrome Flats area of the Paria River drainage in Utah (USDI-FWS 2009). The population covers an area of approximately 4 km (2.5 mi) long by 1.2 km (0.75 mi) wide and is comprised of approximately 20,000 individual plants. Currently, most of the species range (90 %) is located within the Grand Staircase Escalante National Monument (GSENM) which is managed by the Bureau of Land Management. The remaining habitat is owned by Kodachrome Basin State Park and private landowners (USDI-



FWS 2009). For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.



Distribution map of Kodachrome bladderpod

#### *Habitat:*

Due to the unique environmental factors of the area, Kodachrome bladderpod grows with several other mound-forming species, many endemic to the region and even particular geologic substrates (Welsh et al. 2003). The ecological site is described as a *Bouteloua*, (grama species) grassland with scattered Utah juniper; however the vast majority of the habitat has very little vegetative cover. Species found growing in association with Kodachrome bladderpod include antelope bitterbrush (*Purshia tridentata*), yellow cryptantha (*Cryptantha flava*), pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and Indian ricegrass (*Achnatherum hymenoides*) (USDI-FWS 2009).

#### **Adaptation**

This narrow endemic is restricted to white, bare shale knolls derived from the Winsor member of the Carmel Formation in xeric outcrops at 1,700 m (5,700 ft) elevation.

#### **Management**

Since the majority of the species habitat is located within National Monument boundaries, there is no immediate threat from development. However new road construction and off road vehicle (ORV) use are a concern. There also exists an active gravel quarry in Kodachrome bladderpod habitat. GSENM has constructed a

series of fences to deter ORV use within some occupied areas; however most sites remain accessible to public ORV use.

Cattle grazing is currently permitted within GSENM in Kodachrome bladderpod habitat; however, grazing occurs outside of the reproduction season for the species and it is thought that grazing impacts are minimal. Future management plans consist of monitoring of populations, protection from ORV use through signage, fencing and education, and evaluation of cattle use and impacts (USDI-FWS 2009).

#### **Seeds and Plant Production**

Field observations have documented flowering and the presence of potential pollinators which may indicate at least some outcrossing. Flowers bloom from late April through May with seed dispersal in June (USDI-FWS 2009).

#### **References**

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## San Rafael Cactus

*Pediocactus despainii* S.L. Welsh & Goodrich

**Plant Symbol = PEDE17**  
**Listing Status: Endangered**



San Rafael Cactus (*Pediocactus despainii*). Photo from Cactusfriends.com (2010).

**Alternate Names**  
Despain's footcactus

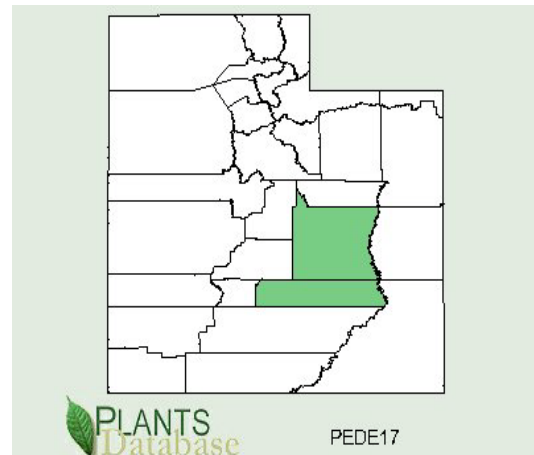
**Uses**  
There are no known human uses associated with San Rafael cactus.

**Status**  
San Rafael cactus was determined endangered and under the protection of the Endangered Species Act by the US Fish and Wildlife Service in 1987 (USDI FWS 1987). Monitoring data show the species to be in decline based on a decrease in the number of vegetative individuals capable of reproducing.

**Description**  
*General:* Cactus family (Cactaceae). San Rafael cactus arises from solitary, hemispheric stems. The plants are 4 to 6 cm tall with spirally

arranged tubercles. The spines are 2 to 6 mm (0.08 to 0.2 in) long and pale yellowish. Flowers are born at the top, are 15 to 25 mm (0.6 to 1.0 in) across with yellow to peach flowers (Welsh et al 2003). The plants shrink underground for several months during dry or cold seasons, and are only noticeable in flower.

*Distribution:*  
This rare species is limited in distribution to five populations in the San Rafael Swell region of Emery County, Utah. Current surveys estimate the total number of individuals at about 20,000.



Distribution map of San Rafael cactus

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

*Habitat:* San Rafael cactus occurs on Juniper/pinyon and salt desert shrub communities on hills, benches and flatlands of the Colorado Plateau.

**Adaptation**  
This species is adapted to limestone gravels, shales, clays and silty substrates of the Morrison, Carmel, and Moenkopi formations at 1850 to 2050 m (6070 to 6700 ft).

**Management**  
San Rafael cactus is highly sought by cactus enthusiasts. It is also under threat from ORV use which is popular in its native habitat. Additionally, approximately half of the species range is covered by oil and gas leases and mining claims.

Management goals are focused on the protection of habitat from disturbance. These include the prevention of plant collection in natural

populations, and implementing conservation measures to minimize and mitigate land use activities (USDI FWS 2007).

#### **Pests and Potential Problems**

The cactus borer beetle (*Moneilema semipunctatum*) is known to parasitize San Rafael cactus.

#### **Seeds and Plant Production**

Plants of San Rafael cactus are illegally taken by cactus collectors and transplanted to pots and gardens. There is however no information available on plant production from seed.

#### **References**

USDI Fish and Wildlife Service. 1987. Endangered and threatened wildlife and

plants; determination of endangered status for *Pediocactus despainii* (San Rafael Cactus). Federal Register. 52 (179): 34914-34917.

USDI Fish and Wildlife Service. 2007. Recovery outline for San Rafael Cactus (*Pediocactus despainii*) and Winkler cactus (*Pediocactus winkleri*). U.S. Fish and Wildlife Service, Salt Lake City, UT. 10 pp.

Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.



## Winkler's pincushion cactus

*Pediocactus winkleri* Barneby

**Plant Symbol = PEWI2**

**Listing Status: Threatened**



Winkler's pincushion cactus (*Pediocactus winkleri*). Photo by E. Neese

### Alternate Names

Winkler's footcactus

### Uses

There are no known human or wildlife uses for Winkler's pincushion cactus. Plants are collected illegally by cactus enthusiasts.

### Status

Winkler's pincushion cactus was listed as a threatened species by the USDI Fish and Wildlife Service in 1998 (USDI-FWS, 1998). Monitoring data indicate that populations are in decline (USDI-FWS, 2007).

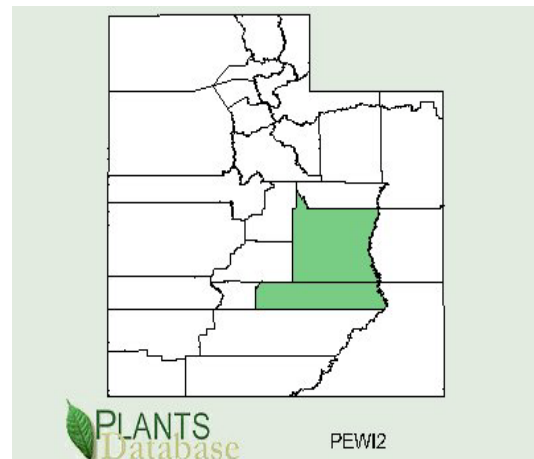
### Description

**General:** Cactus family (Cactus). Winkler's pincushion cactus is a solitary or sometimes colonial, spherical or depressed-hemispheric cactus growing 4 to 7 cm (1.6 to 2.8 in) tall and 3 to 5 cm (1.2 to 2.0 in) wide. The tubercles are 4 to 7 mm (0.16 to 0.28 in) long and 5 to 7 mm (0.20 to 0.28 in) wide. The areoles are white-woolly with no central spine. There are 8 to 14 white radial spines, 1.5 to 4 mm (0.06 to 0.16 in) long. The flowers are peach to pink with petals and sepals looking similar. The fruit is a smooth green oval-shaped berry drying reddish brown, 7 to 10 mm (0.28 to 0.39 in) long and 8 to 11 mm (0.31 to 0.43 in) wide. The seeds are 2.5 to 3 mm (0.10 to 0.12 in) long and shiny black (Welsh et al., 2003).

In 1995, Hochstatter proposed that Winkler's pincushion cactus and San Rafael cactus (*P. despainii*) be considered subspecies of Brady's pincushion cactus (*P. bradyi*), a federally listed species from northern Arizona. However; Heil and Porter (2004) showed through DNA analysis that *P. winkleri* and *P. despainii* were more closely allied to, but distinct species from mountain ball cactus (*P. simpsonii*).

### Distribution:

There are four known populations of Winkler's pincushion cactus located in north central Wayne County, Utah on the eastern boundary of Capitol Reef National Park to extreme southwest Emery County, Utah. There are approximately 4,500 documented individuals of Winkler's pincushion cactus in known populations and an additional 20,000 individuals estimated in unsurveyed available habitat (USDI-FWS, 2007). The majority of Winkler's pincushion cactus habitat is located on Federal lands managed by USDI-BLM and USDI-NPS.



Distribution map of Winkler's pincushion cactus

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Winkler's pincushion cactus occurs in the galleta-three awn shrub steppe and salt desert shrub plant communities in association with saltbush (*Atriplex* spp.) galleta (*Hilaria* sp.) and purple three awn (*Aristida purpurea*) (USDI-FWS, 2007).

### Adaptation

This species is adapted to poor quality, saline, fine-textured substrates of the Dakota, Mancos and Morrison Formations from 1,460 to 1,590 m

(4,790 to 5,220 ft) (Welsh et al., 2003). Average annual precipitation for the area is 15 to 25 cm (6 to 10 in) (USDI-FWS, 2007).

### **Management**

Threats to Winkler's pincushion cactus include illegal plant collecting, off road vehicle (ORV) use and livestock trampling, mineral exploration, insect infestations, and climate change (USDI-FWS, 2007). Conservation measures for this species include mitigating the effects of human land use activities on known populations, and preventing the illegal collection of plants from natural populations. Further work surveying suitable habitat and determining biological and ecological factors for the species distribution are also indicated (USDI-FWS, 2007).

### **Pests and Potential Problems**

Winkler's pincushion is known to be susceptible to infestations of insect larvae including the cactus borer beetle (*Moneilema semipunctatum*) (USDI-FWS, 2007).

### **Seed and Plant Production**

Cuttings of Winkler's pincushion cactus were successfully rooted spontaneously on hormone-free media and were subsequently re-established in the greenhouse (Clayton et al., 1990).

### **References**

- Clayton, P.W., Hubstenberger, J.F., Phillips, G.C. and S.A. Butler-Nance. 1990. Micropropagation of members of the Cactaceae subtribe cactinae. *Journal of the American Society for Horticultural Science*. 115(2): 337-343.
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- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. *A Utah Flora*. Third Edition, revised. Brigham Young University, Provo, UT.

## Clay Phacelia

*Phacelia argillacea* Atwood

Plant Symbol = PHAR2

Listing Status: Endangered



Atwood's phacelia (*Phacelia argillacea*). Photo by Denise Van Keuren

### Alternate Names

Atwood's phacelia

### Uses

There are no known human uses of Atwood's phacelia. The stems are eaten by rock squirrels (USDI-FWS, 1982).

### Status

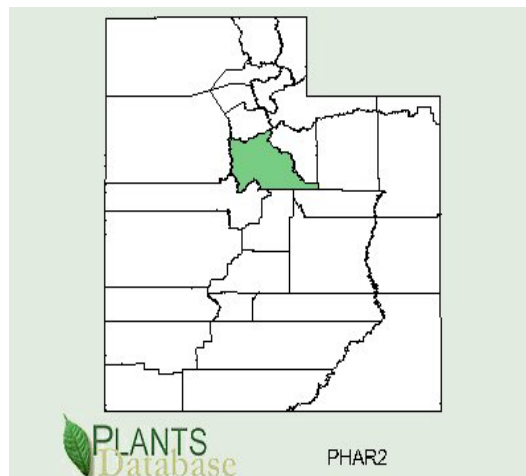
Atwood's phacelia was listed as endangered in 1978 by the USDI Fish and Wildlife Service (USDI-FWS, 1978). At the time of listing, the species was known from a single population containing nine individuals. In 1980 a second population was discovered bringing the total number of individuals to approximately 200 (USDI-FWS, 1982). In 2005, seed collections and germination studies yielded 53 potted plants, which subsequently produced 11,000 seeds. These seeds are to be used in further studies and reestablishment ventures (USDA-FS, 2011).

### Description

*General:* Waterleaf family (Hydrophyllaceae). Atwood's phacelia is a winter annual forb with one to several stems. It grows to a height of 36 cm (14 in) tall. The leaves are 5 to 25 cm (2 to 10 in) long and deeply lobed. The inflorescence is a compound, scorpioid cyme (curling like a scorpion's tail), with blue to violet bell-shaped flowers with 4 to 6 mm (0.16 to 0.24 in) long petals (Welsh et al., 2003).

### Distribution:

Atwood's phacelia is known from two locations near Tucker, Utah in Utah County. Another population, from which herbarium specimens were taken in 1883, has not been relocated (USDI-FWS, 1982).



Distribution of Atwood's phacelia

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Atwood's phacelia is found on shaley-clay slopes in pinyon-juniper and mountain brush communities at 2,015 m (7,050 ft) elevation. The nearby Soldier Summit weather station indicates an average of 35 cm (14 in) of annual precipitation (WRCC, 2010).

### Adaptation

Atwood's phacelia is endemic to clay and shale soils of the Green River Formation on east and southeast facing slopes. The locations of the two populations, though high in elevation, are considered to be on xeric sites because of the steepness and exposure (USDI-FWS, 1982).

### Management

The existing populations of Atwood's phacelia are located on private property owned by the D&G RGW Railroad. The primary threat to the species is habitat destruction due to construction activities by the railroad company. A major goal in the recovery effort is to establish new populations on publically owned lands that can receive a higher level of protection (USDA-FS, 2010). The objective of the recovery plan is to establish a self-sustaining population of 2,000 to 3,000 individuals on 120 acres of protected

habitat, and to possibly establish at least one new population (USDI-FWS, 1982).

### **Seed and Plant Production**

Germination occurs in late summer and early fall with the onset of summer and fall storms. The seedlings form a basal rosette that continues to grow beneath snow cover. The flowers bolt after snowmelt in May. Seed production has been successful under research conditions (USDA-FS, 2010).

### **References**

USDA-FS. 2010. Uinta National Forest introduction program to recover clay phacelia, *Phacelia argillacea*, one of Utah's most endangered species. Online at <http://www.fs.fed.us/wildflowers/rareplants/>

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USDI- Fish and Wildlife Service. 1982. Clay phacelia (*Phacelia argillacea*) recovery plan. U.S. Fish and Wildlife Service. Denver, Colorado. 13pp.

Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.

Western Regional Climate Center. 2010. Online. <http://www.wrcc.dri.edu/index.html>. Accessed January 4, 2010.

## Maguire Primrose

*Primula cusickiana* (A. Gray) A. Gray  
var. *maguirei* (L.O. Williams) N.H.  
Holmgren & S. Kelso

Plant Symbol = PRCUM

Listing Status: Threatened



Maguire's primrose (*Primula cusickiana* var. *maguirei*).  
Photo from USDA-FS

### Alternate Names

*Primula maguirei*

### Uses

There are no known uses associated with Maguire's primrose.

### Status

Maguire's primrose has an estimated population size of about 3,000 individuals in six sites in Logan Canyon, Utah. The entire known habitat of Maguire's primrose lies within Federal lands managed by the Logan Ranger District of the Wasatch-Cache National Forest. It was listed as a threatened species in 1985 (USDI-FWS, 1985). The species is highly vulnerable due to its restricted habitat and small population size. Its primary threats include habitat loss due to road construction and recreational activities.

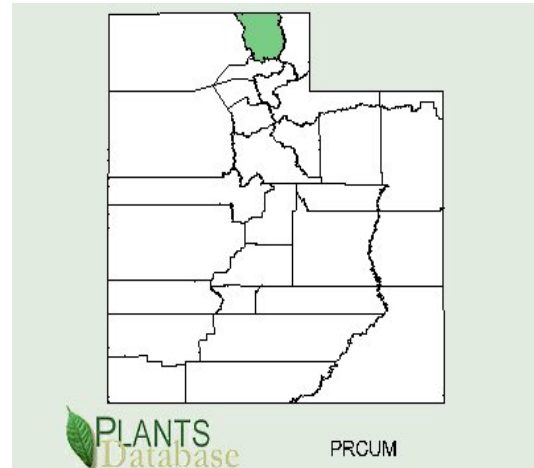
### Description

*General:* Primrose family (Primulaceae).  
Maguire's primrose is a small, herbaceous, perennial forb. The leaves are clustered around the base of the plant and are oblanceolate to spatulate and range from 2 to 7 cm (1 to 3 in) long. They can be smooth edged or toothed and have glands on both sides. The flowers are born in a 1 to 3 flowered cluster on a naked stem reaching 15 cm (6 in) in height. Each plant can have 1 to several flower bearing stems. The

flowers are rose to lavender in color with a yellow center (Welsh et al., 2003).

### Distribution:

There are six known populations of Maguire's primrose; all located in Logan Canyon, Cache County, Utah.



Distribution map of Maguire primrose

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Maguire's primrose is restricted to shallow dolomitic soils of the Laketown and Fish Haven geologic formations. It can be found in north facing exposures in cracks and crevices of cliff and boulder faces from 1,400 to 1,800 m (4,800 to 6,000 ft) elevation. It is always found in cool, moist microclimates. It can be found growing in association with pink alumroot (*Huechera rubescens*), mat rockspirea (*Petrophytum caespitosum*), tadpole buttercup (*Ranunculus ranunculinus*), and narrowleaf wildparsley (*Musineon lineare*), surrounded by mountain shrub and coniferous forest plant communities.

### Adaptation

Maguire's primrose is found in cool, moist microclimates on dolomitic limestone derived soils. Mean annual precipitation in the canyon ranges from 18 to over 25 inches.

### Management

The greatest threats to the continuing survival of Maguire's primrose come from habitat loss as a result of highway construction and other activities (USDI-FWS, 1990). Maintenance and improvements of water pipelines through the canyon could also impact the species. Other

threats include camping, rock climbing and horticultural plant collecting.

**Seeds and Plant Production**

Limited efforts have been attempted to propagate and produce Maguire's primrose. Past gardening attempts have been mostly unsuccessful.

**References**

USDI- Fish and Wildlife Service. 1985. Endangered and threatened wildlife and

plants; final rule to determine *primula maguirei* (Maguire primrose) to be a threatened species. In: Federal Register. 50(162): 33731-33737.

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Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.



# Autumn Buttercup

*Ranunculus aestivalis* (L.S. Benson)  
Van Buren & Harper

Plant Symbol = RAAE  
Listing Status: Endangered



Figure 1. Fall buttercup (*Ranunculus aestivalis*). Photo from UTDNR (2010).

## Alternate Names

Fall buttercup  
*R. acriformis* var. *aestivalis*  
*R. acris* var. *aestivalis*

## Uses

There are no known human uses associated with autumn buttercup. It is grazed by cattle and eaten by small mammals.

## Status

Autumn buttercup was first collected in 1894 by Marcus E. Jones in Garfield County, UT. It was later recollected and described as a new species by Benson in 1948. Surveys made in the 1970s could not locate any plants at the original localities and the species was believed to have gone extinct until 1982 when a small population was discovered 1.6 km (1 mi) from the original collection location. Monitoring from 1983 through 1989 showed a 90 percent decrease in individuals, going from over 400 individuals to approximately 20 as a result of continued grazing and habitat modification. Autumn buttercup was listed endangered by the USDI Fish and Wildlife Service (1989) when it was known from a single 0.004 ha (0.01 ac) population which numbered approximately 20 individuals.

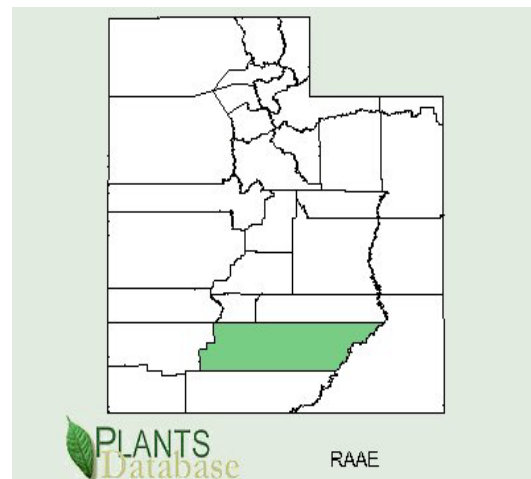
The species has been assigned a recovery priority of 6 indicating it as a subspecies with a high degree of threat and low recovery potential (USDI-FWS 1991). In 1989 The Nature Conservancy purchased a 44 acre tract of land encompassing the existing population and excluding domestic livestock grazing. Since that time, two additional small populations have been discovered within the Nature Conservancy's parcel. As of 1991 there were an estimated 200 individual plants (USDI FWS 1991).

## Description

**General:** Buttercup family (Ranunculaceae). Autumn buttercup is a short-lived perennial forb from 0.2 to 0.5 m tall. Basal leaf blades are simple with three main lobes which are notched or lobed at the tips. The petioles (leaf stalks) are 3 to 15 cm (1.8 to 5.9 in) long. The plant bears yellow flowers with 5 petals which are approximately 1 cm long (Welsh et al. 2003).

## Distribution:

Autumn buttercup is known from a small area along the Sevier River north of Panguitch, Utah at 1950 m (6400 ft) in elevation. Other similar habitats in surrounding areas are held by private land owners and have not been thoroughly investigated botanically (Welsh et al. 2003).



Distribution map of autumn buttercup

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

## Habitat:

The known populations exist in wet saline meadows consisting of sedges, rushes and grasses. Dominant species in the community include wiregrass (*Juncus arcticus*), sea



milkwort (*Glaux maritima*) and Nebraska sedge (*Carex nebrascensis*). The site was historically grazed by livestock until 1988 (Spence 1996).

### **Adaptation**

This species is adapted to wet meadows at the transition zone between *Carex* dominated communities and dry upland meadows.

### **Management**

Early researchers assumed that grazing by domestic livestock was a major threat to autumn buttercup and contributed to its decline (USDI FWS 1989; USDI FWS 1991). However; since the exclusion of livestock to autumn buttercup population sites, numbers have continued to drop (Spence 1996). From these observations, Spence (1996) developed two hypotheses for the decrease in individuals at the Nature Conservancy Preserve: 1) decrease in moisture levels and 2) the ABSENCE of grazing. Diversion of springs that sub-irrigate the monitored stand and nearby prospective reintroduction sites may have caused a plant community shift which favors other plant species over autumn buttercup. Additionally, disturbance caused by cattle grazing may have opened sites for autumn buttercup to grow large enough to flower and spread. In the absence of disturbance, other quickly spreading species such as wiregrass would have a competitive advantage.

USDI FWS goals for the species include developing a habitat management plan, and conducting population monitoring studies (1991). There are also plans to inventory potential habitat to find unknown populations and suitable habitat for beginning new

populations. Plant reproduction and establishment studies are also indicated.

### **Seeds and Plant Production**

Methods for propagating Autumn buttercup have been developed, using tissue cultures started from seedlings. Plants produced in this project have been used to augment a declining population of this species in Utah (CREW 2010).

### **References**

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- USDI-Fish and Wildlife Service. 1989. Endangered and threatened wildlife and plants: final rule to determine a "*Ranunculus acriformis*" var. "*aestivalis*" (autumn buttercup) to be endangered. Federal Register. 54 (139): 30550-30554.
- USDI-Fish and Wildlife Service. 1991. Autumn buttercup (*Ranunculus acriformis* var. *aestivalis*) recovery plan. U.S. Fish and Wildlife Service, Denver, CO. 20p.
- Utah Division of Natural Resources. 2010. Autumn buttercup [Online]. Available at <http://dwr.cdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=ranuaest> (accessed 20 Apr 2010). UTDWR, Salt Lake City, UT.
- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.

## Clay Reed-Mustard

*Schoenocrambe argillacea* (S.L. Welsh & N.D. Atwood) Rollins

Plant Symbol = SCAR5  
Listing Status: Threatened



Clay reed-mustard (*Schoenocrambe argillacea*). Photo by J.S. Peterson, USDA-PLANTS database

### Alternate Names

Clay schoenocrambe  
*Hesperidanthus argillaceus*  
*Thelypodopsis argillacea*  
Uinta Basin plainsmustard

### Uses

There are no known human or wildlife uses of clay reed-mustard.

### Status

Clay reed-mustard was listed as a threatened species in 1992 based on its small population size, restricted distribution and existing threats (USDI-FWS, 1992).

Recently, Al-Shehbaz, and subsequently, the Flora of North America, combined *much of*

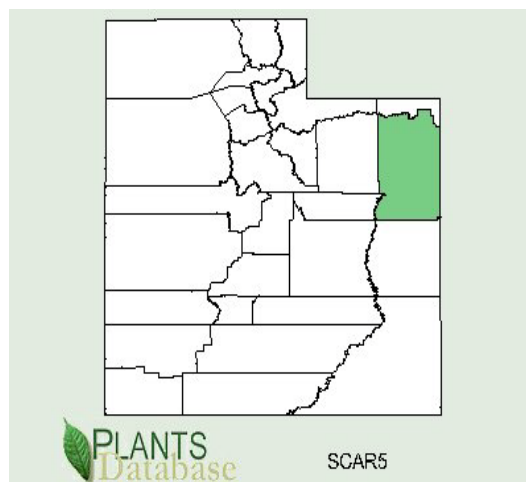
*Schoenocrambe* into the larger genus *Hesperidanthus* (Al-Shehbaz, 2005). This change has not yet been adopted by the PLANTS database or USDI Fish and Wildlife Service.

### Description

*General:* Mustard family (Brassicaceae). Clay reed-mustard is a perennial forb with 13 to 30 cm (5 to 12 in) tall simple or branched stems, arising from a branching woody caudex and stout taproot. The linear leaves are somewhat thickened and glaucous, 9 to 35 mm (0.35 to 1.4 in) long and 1 to 2 mm (0.04 to 0.08 in) wide. The inflorescence is a 5 to 22 flowered raceme. The flowers sit on 7 to 18 mm (0.3 to 0.7 in) long pedicels; the white or pink petals are 8 to 11 mm (0.3 to 0.4 in) long and are suffused with conspicuous purple veins. The fruit is a silique (a lengthened pod), 18 to 55 mm (0.7 to 2.2 in) long and approximately 1 mm (0.04 in) wide (Welsh et al., 2003).

### Distribution:

There are three known populations of clay reed-mustard, all located in Uintah County, Utah. The entire species range stretches approximately 21 km (13 mi) from Green River to Willow Creek. There are approximately 6,000 plants total (USDI-FWS, 1994).



Distribution of Clay reed-mustard

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Clay reed-mustard occurs in desert shrub plant communities in association with shadscale (*Atriplex confertifolia*), Indian ricegrass (*Achnatherum hymenoides*), pygmy sagebrush (*Artemisia pygmaea*), western wheatgrass

(*Pascopyrum smithii*), Salina wildrye (*Elymus salina*), and jointfir (*Ephedra* spp.) (USDI-FWS, 1994; Welsh et al., 2003).



Clay reed-mustard habitat. Photo by J.S. Peterson, USDA-PLANTS database

### Adaptation

Clay reed-mustard grows on gypsiferous clay soils overlain with sandstone talus resulting from a mixture from the zone of contact between the Uinta and Green River formations (USDI-FWS, 1994). This species occurs in a narrow band from 1,465 to 1,720 m (4,800 to 5,640 ft) in a 15 to 23 cm (6 to 9 in) precipitation zone (WRCC, 2011).

### Management

Existing threats to clay reed-mustard include oil and gas exploration, oil-shale mining, stone quarrying, and off-road vehicle (ORV) use. All known populations are found on Federal lands leased for oil and gas energy reserves.

Additionally, this species' range is underlain by oil shale, which may be mined when economic conditions for oil extraction becomes favorable (USDI-FWS, 1994).

Management goals for clay reed-mustard include inventorying suitable habitat, conducting

population studies, and controlling activities affecting the sensitive habitat.

### Pests and Potential Problems

Historical sheep and cattle grazing use may have impacted clay reed-mustard on USDI-BLM lands. However current grazing levels are not believed to pose a serious threat (USDI-FWS, 1994).

### Seed and Plant Production

Flowering occurs from April to May with fruit ripening in May to June (USDI-FWS, 1994). No propagation information is currently available.

### References

- Al-Shehbaz, I. A. 2005. *Hesperidanthus* (Brassicaceae) revisited. *Harvard Pap. Bot.* 10: 47-51.
- USDI-Fish and Wildlife Service. 1992. Endangered and threatened wildlife and plants; final rule to determine the plant *Schoenocrambe argillacea* (Clay reed-mustard) to be a threatened species, and the plant *Schoenocrambe barnebyi* (Barneby reed-mustard) to be an endangered species. In: *Federal Register*. 57(9): 1396-1403.
- USDI-Fish and Wildlife Service. 1994. Utah reed-mustards; clay reed-mustard (*Schoenocrambe argillacea*), Barneby reed-mustard (*Schoenocrambe barnebyi*), shrubby reed-mustard (*Schoenocrambe suffrutescens*) recovery plan. Denver, Colorado. 22p.
- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. *A Utah Flora*. Third Edition, revised. Brigham Young University, Provo, UT.
- Western Regional Climate Center. 2011. Online. <http://www.wrcc.dri.edu/index.html>. Accessed January 13, 2011.

## Barneby Reed-Mustard

*Schoenocrambe barnebyi* (S.L. Welsh & N.D. Atwood) Rollins

Plant Symbol = SCBA80

Listing Status: Endangered



Barneby reed-mustard (*Schoenocrambe barnebyi*). Photo by C.R. Delmatier

### Alternate Names

Syes Butte Plainsmustard

*Thelypodiopsis barnebyi*

### Uses

There are no known human or wildlife uses of Barneby reed-mustard.

### Status

Barneby reed-mustard was determined by the USDI-Fish and Wildlife Service to be an endangered species warranting protection in 1992 (USDI-FWS, 1992). There are an estimated 2,000 individual plants in existence (USDI-FWS, 1994).

### Description

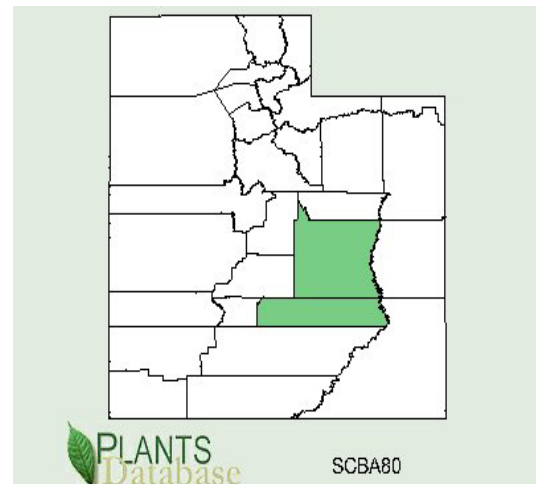
*General:* Mustard family (Brassicaceae).

Barneby reed-mustard is a perennial forb with

multiple stems arising from a branching woody caudex and taproot. The stems grow 10 to 35 cm (4 to 14 in) tall, and bear elliptical, entire leaves which can be hairy to glabrous and glaucous. The leaves are 13 to 51 mm (0.50 to 2.0 in) long and 4 to 24 mm (0.16 to 0.94 in) wide with 0.4 to 10 mm (0.02 to 0.40 in) long petioles. The flowers have four white to lavender petals, 10 to 12 mm (0.40 to 0.47 in) long, with conspicuous purple veins. The fruit is a silique (a lengthened pod), 34 to 65 mm (1.34 to 2.56 in) long and 1 to 2 mm (0.04 to 0.08 in) wide (Welsh, et al., 2003).

### Distribution:

There are two known populations of Barneby reed-mustard. One population is within the boundary of Capitol Reef National Park in the Fremont River drainage west of Fruita, Utah in Wayne County, and the other population is in the southern portion of the San Rafael Swell in Emery County, Utah. The two populations are separated by a distance of approximately 40 km (25 mi).



Distribution map of Barneby reed-mustard

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Barneby reed-mustard inhabits semi arid canyonlands on steep slopes, generally with northern exposures. The plants grow in mixed shadscale (*Atriplex confertifolia*), buckwheat (*Eriogonum corymbosum*) and ephedra (*Ephedra torreyana* and *E. viridis*) plant communities (Welsh et al., 2003). Other plant associates include Utah serviceberry (*Amelanchier utahensis*), galleta grass (*Hilaria jamesii*), tarragon (*Artemisia dracunculus*) and

rubber rabbitbrush (*Ericameria nauseosa*) (USDI-FWS, 1994).

### **Adaptation**

This species is endemic to red clay soils derived from the Moenkopi and Chinle Formations overlain with sandstone talus. These soils are rich in selenium and gypsum (USDI-FWS, 1994). Both populations are found in a 15 to 23 cm (6 to 9 in) mean annual precipitation zone (WRCC, 2011).

### **Management**

Existing threats to the survival of Barneby reed-mustard include oil and gas exploration, oil-shale mining, stone quarrying, and off-road vehicle (ORV) use. An additional potential threat is habitat destruction due to uranium mining activity. A large portion of the San Rafael Swell population lies within existing mining claims. The Capitol Reef National Park population is at risk of habitat destruction from foot traffic caused by park visitors (USDI-FWS, 1994).

Management goals include the establishment of a minimum of 5 separate populations consisting of 2,000 or more individuals per population. This is to be accomplished by controlling the habitat threatening activities listed above, and by identifying suitable habitat for additional populations and introducing propagated materials. Life history, reproduction and ecological studies for the species are also indicated (USDI-FWS, 1994).

### **Pests and Potential Problems**

Historical sheep and cattle grazing use may have impacted Barneby reed-mustard on USDI-BLM lands. However current grazing levels are not believed to pose a serious threat.

### **Seed and Plant Production**

Reproduction of Barneby reed-mustard is sexual. Flowering occurs from April to May with fruit ripening in May to June. Specific pollination vectors are unknown (USDI-FWS, 1994).

### **References**

- USDI-Fish and Wildlife Service. 1992. Endangered and threatened wildlife and plants; final rule to determine the plant *Schoenocrambe argillacea* (Clay reed-mustard) to be a threatened species, and the plant *Schoenocrambe barnebyi* (Barneby reed-mustard) to be an endangered species. In: Federal Register. 57(9): 1398-1403.
- USDI-Fish and Wildlife Service. 1994. Utah reed-mustards; clay reed-mustard (*Schoenocrambe argillacea*), Barneby reed-mustard (*Schoenocrambe barnebyi*), shrubby reed-mustard (*Schoenocrambe suffrutescens*) recovery plan. Denver, Colorado. 22p.
- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.
- Western Regional Climate Center. 2011. Online. <http://www.wrcc.dri.edu/index.html>. Accessed January 13, 2011.



## Uinta Basin Hookless Cactus Complex Including:

### Pariette Cactus

*Sclerocactus brevispinus* K.D. Heil and J.M. Porter

### Colorado Hookless Cactus

*S. glaucus* (K. Schumann) L.D. Benson

### Uinta Basin Hookless Cactus

*S. wetlandicus* Hochstätter

Plant Symbol = SCGL3

Listing Status: Threatened



Uinta Basin hookless cactus (*Sclerocactus glaucus*). Photo by Barry C. Johnston

#### Uses

Uinta Basin cactus and other rare cacti are targeted by cactus collectors. These species have no known human uses.

#### Status

Uinta Basin hookless cactus (*Sclerocactus glaucus*) was listed as a threatened species by the USDI Fish and Wildlife Service in 1979 (USDI-FWS, 1979). Since that time, the species has undergone numerous taxonomic changes, being

described as up to three distinct taxa. In 2009, the USDI-Fish and Wildlife Service followed Hochstätter's treatment of the genus (1997) and the taxonomic nomenclature accepted by the Flora of North America (Heil and Porter, 2004), and relisted three species as threatened: Pariette cactus (*S. brevispinus*), Colorado hookless cactus (*S. glaucus*) and Uinta Basin hookless cactus (*S. wetlandicus*) (USDI-FWS, 2009). USDI-FWS has further stated their intent to propose reclassification of Pariette cactus from threatened to endangered (USDI-FWS, 2006).

#### Description

**General:** Cactus family (Cactaceae). Plants of all three species grow as unbranched spheres or cylinders with tubercles on the ribs. The above ground portion of the spheres reaches 4 to 18 cm (2 to 7 in) tall and 2.5 to 12 cm (1 to 4.5 in) in diameter. There are 6 to 14 radial spines and 1 to 5 central spines per areole. The flowers are funnel or bell-shaped, 5 cm long (2 in) and 2 to 3 cm (0.8 to 1.2 in) across. The inner tepals are pink or violet, 2 to 3 cm (0.8 to 1.2 in) long and 3 to 6 mm (0.1 to 0.2 in) wide. The fruit is an indehiscent oval shaped berry. The seed is black, 1.5 to 2.5 mm (0.06 to 0.1 in) long (Heil and Porter, 2004).

The three species can be tentatively separated as follows (Heil and Porter, 2004):

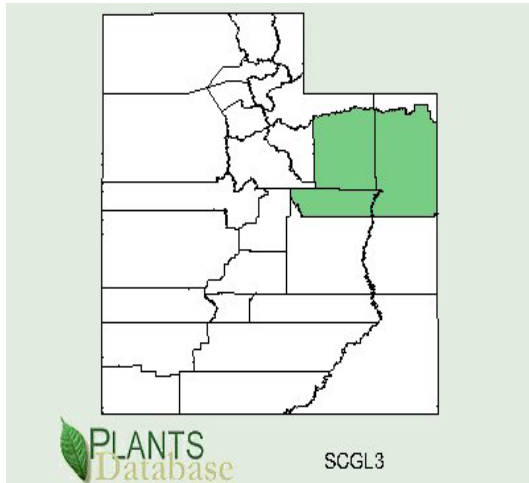
1. Seed surface composed of convex cells; plants of Colorado *S. glaucus*
1. Seed surface composed of flattened cells; plants of Utah
2. Abaxial central spines usually not hooked; flowers funnel shaped; outer and inner tepals brownish lavender, violet, or pink, 2.5 to 5 cm diameter *S. wetlandicus*
2. Abaxial central spines often absent, or if present, then all curved or hooked; flowers bell shaped; outer tepals greenish to purple, inner tepals purple, 1.1 to 3 cm diameter *S. brevispinus*

#### Distribution:

Colorado hookless cactus is known from populations in Montrose, Mesa, Delta and Garfield Counties, Colorado.

Uintah Basin hookless cactus is endemic to the Uinta Basin in northeastern Utah. Its range covers an area approximately 96 km long by 40 km wide (60 mi by 25 mi) wide containing approximately 30,000 individuals.

Pariette cactus is restricted to the Pariette Draw of the central Uinta Basin (USDI-FWS, 2006b). There is a single known population covering an area of approximately 16 km (10 mi) long by 8 km (5 mi) wide. The total species population is estimated at 8,000 individuals (USDI-FWS, 2007).



Distribution map of Uinta Basin hookless cactus and Pariette cactus

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

**Habitat:**

These three cactus species grow on sparsely vegetated arid desert shrubland in association with shadscale (*Atriplex confertifolia*), rabbitbrush (*Ericameria nauseosa*) and horsebrush (*Tetradymia* spp.).

**Adaptation**

Colorado hookless and Uinta Basin hookless cactus are found on coarse soils derived from stream terrace deposits, or on rocky surfaces on mesa slopes at 1,350 to 1,900 m (4,400 to 6,200 ft) in elevation. Pariette cactus is found on fine clay soils in the badlands derived from the Uinta Formation (USDI-FWS, 2006b). The range of all three species lies in an area receiving 15 to 22 cm (6 to 9 in) of mean annual precipitation.

**Management**

Habitat of all three cactus species is threatened by oil and gas production and development. Most of the range of Uinta Basin cactus lies within existing oil and gas fields or within undeveloped oil and gas lease areas (USDI-FWS, 2006a). Additional threats come from illegal collection from succulent plant enthusiasts.

Illegal collection rates continue to increase as oil and gas related roads are created in the species' range. Livestock trampling and recreational off highway vehicle (OHV) use are also considered threats.

**Pests and Potential Problems**

Parasitism is known to occur with other members of the genus; however, specific threats are as yet unknown for these three species.

**Seed and Plant Production**

These cactus species flowers April to May and are pollinated by native bees, and possibly ants and beetles (USDI-FWS, 2007).

**References**

Heil, K.D., and J.M. Porter. 2004. *Sclerocactus* in: Flora of North America, north of Mexico Volume 4, Magnoliophyta: Caryophyllidae, part 1. Edited by: Flora of North America Editorial Committee. Oxford University Press. New York. Pp. 197-207.

USDI- Fish and Wildlife Service. 1979. Endangered and threatened wildlife and plants; determination that *Sclerocactus glaucus* is a threatened species. In: Federal Register 44(198).

USDI- Fish and Wildlife Service. 2006. 5-year review of Uinta Basin hookless cactus (*Sclerocactus glaucus*). Denver, Colorado.

USDI- Fish and Wildlife Service. 2006. Endangered and threatened wildlife and plants; 90-day finding on a petition to remove the Uinta Basin Hookless Cactus from the list of endangered and threatened plants; 90-day finding on a petition to list the Pariette cactus as threatened or endangered. In: Federal Register 71(240): 75215-75220.

USDI- Fish and Wildlife Service. 2007. Endangered and threatened wildlife and plants; 12-month finding on a petition to list *Sclerocactus brevispinus* (Pariette cactus) as an endangered or threatened species; taxonomic change from *Sclerocactus glaucus* to *Sclerocactus brevispinus*, *S. glaucus*, and *S. wetlandicus*. In: Federal Register 72(180): 53211-53222.

USDI- Fish and Wildlife Service. 2009. Endangered and threatened wildlife and plants; taxonomic change of *Sclerocactus glaucus* to three separate species. In: Federal Register 74(177): 47112-47117.



## Siler's Pincushion Cactus

*Sclerocactus sileri* (L.D. Benson) K.D. Heil & J.M. Porter

Plant Symbol = SCSI3

Listing Status: Endangered



© Jane Villa-Lobos  
Siler pincushion (*Sclerocactus sileri*). Photo from Jane Villa-Lobos @ USDA-NRCS PLANTS Database

### Alternate Names

Gypsum cactus  
*Echinocactus sileri*  
*Pediocactus sileri*  
*Utahia sileri*

### Uses

There are no known human uses associated with Siler's pincushion cactus.

### Status

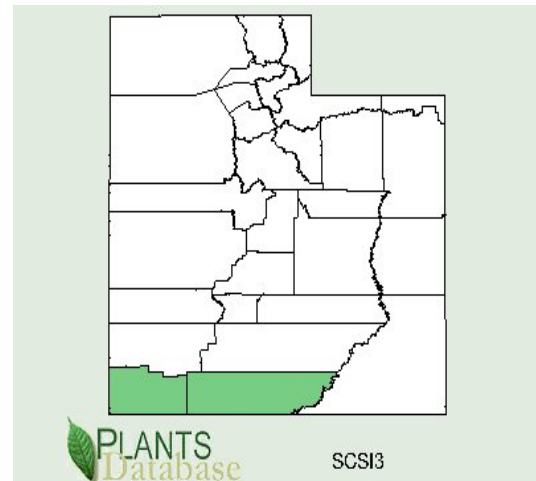
Siler's pincushion cactus was listed as an endangered species in 1979 (USDI FWS 1979) and later reclassified as threatened in 1993 (USDI FWS 1993) when it was no longer considered to be in imminent danger of extinction throughout significant portions of its range. Critical habitat was not designated with either ruling.

### Description

*General:* Cactus family (Cactaceae). Siler's pincushion is a small, globose cactus which grows solitary or in clusters. Individuals grow about 25 cm (9.8 in) tall and 12 cm (4.7 in) wide. Central spines are blackish brown, 15 to 30 mm (0.6 to 1.2 in) long, and radial spines are 10 to 20 mm (0.4 to 0.8 in) long and white. Flowers are about 20 mm (0.8 in) in diameter with yellow petals which may have purplish veins. Flowering occurs in the spring (Welsh et al 2003).

### Distribution:

All known populations of this species occur in Kane and Washington counties, Utah and in Mohave and Coconino counties, Arizona. The majority of the habitat occurs on USDI BLM land. Small portions of the species range occur on lands managed by the Kaibab-Paiute Indian Tribe, Arizona and Utah State trust lands and private holdings.



Distribution map of Siler's pincushion cactus

### Habitat:

This species inhabits a variety of plant communities including Great Basin desert shrub, Mohave Desert scrub, pinyon-juniper forestlands and grasslands (USDI FWS 1993). Plants occur from 850 to 1,650 meters (5400 feet).

### Adaptation

Siler's pincushion is found on gypsiferous clay and sandy soils derived from the Moenkopi Formation. Most of the populations are found on the Shnabkaib Member of the formation, while others occur on the Middle Red member.

### Management

Threats to the species include off road vehicle use, trampling by cattle, soil erosion and mineral exploration. Many plants in plots monitored by the BLM died of natural causes including drought, insect and small mammal herbivory. A relatively new potential threat to Siler's pincushion is the proposed development of a pipeline from Lake Powell to St. George, Utah.

A Siler's pincushion Cactus recovery plan was developed in 1986. Management goals include continued monitoring, providing conservation assistance to the Kaibab-Paiute Indian Tribe,

closing areas with dense Siler's pincushion to ORV use, and conducting research on insect predators (USDI FWS 1986).

#### **Pests and Potential Problems**

Cactus borer beetles (*Moneilema* spp) are known to parasitize close relatives of Siler's pincushion, but they have not yet been documented on this species (USDI FWS 2008).

#### **Seeds and Plant Production**

This species is difficult to grow under cultivation. Seed germinates readily, but plants quickly die due to the species' restricted soil adaptation. Transplanting and grafting have not been successful (USDI FWS 1993).

#### **References**

- USDI Fish and Wildlife Service. 1986. Siler pincushion cactus (*Pediocactus sileri*) recovery plan. 57 p.
- USDI Fish and Wildlife Service. 1993. Endangered and threatened wildlife and plants; reclassification of the plant *Pediocactus sileri* (Siler pincushion cactus) from endangered to threatened status. Federal Register. 58 (246): 68476-68480.
- USDI Fish and Wildlife Service. 2008. Siler pincushion cactus (*Pediocactus sileri*) 5-year review: summary and evaluation. Phoenix, AZ.
- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.

# Wright Fishhook Cactus

## *Sclerocactus wrightiae* Benson

**Plant Symbol = SCWR**

**Listing Status: Endangered**



Wright fishhook cactus (*Sclerocactus wrightiae*). Photo by D. Jolley

### Alternate Names

*Ferocactus wrightiae* (L. D. Benson) N. P. Taylor

*Pediocactus wrightiae* (L. D. Benson) Arp

### Uses

There are no known human or wildlife uses for Winkler's pincushion cactus. Plants are eagerly sought by collectors for horticultural purposes leading to the species' decline (USDI-FWS, 1979).

### Status

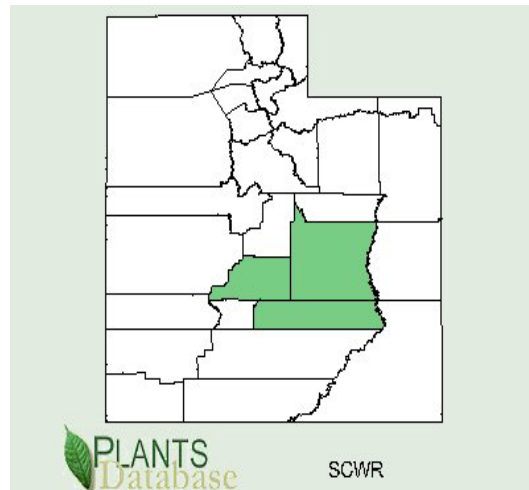
Wright fishhook cactus was listed as an endangered species by the USDI Fish and Wildlife Service in 1979 based on its limited population size and distribution as well as known and potential threats from collection, mineral exploration, and off road vehicle (ORV) use (USDI-FWS, 1979). In 2005 the USDI-FWS affirmed this listing, noting there is not substantial information warranting the delisting of Wright fishhook cactus (USDI-FWS, 2005). Field surveys indicate the species is slowly declining within its known range.

### Description

*General:* Cactus family (Cactaceae). Wright fishhook cactus is a hemispheric or short-cylindrical cactus reaching 6 to 12 cm (2.4 to 4.8 in) tall and 4 to 8 cm (1.6 to 3.1 in) in diameter. Each plant has 8 to 13 ribs with tubercles approximately 12 mm (0.51 in) long by 9 mm (0.35 in) across and 6 to 9 mm (0.24 to 0.35 in) high. There are 1 to 4 central spines, typically 10 to 20 mm (0.39 to 0.79 in) long with the uppermost spines reaching 25 mm (0.98 in) long; the lower central spine is often hooked on at least the upper tubercles. Each tubercle has 8 to 11 white, spreading, radial spines, 6 to 12 mm (0.24 to 0.47 in) long. The flowers are 2 to 3.5 cm (0.8 to 1.4 in) long with green to brownish tinged sepals and white, pink or yellow petals. The fruit is an elliptical 9 to 12 mm (0.35 to 0.51 in) long berry with 3 mm (0.12 in) long, black seeds (Welsh et al., 2003).

### Distribution:

Wright fishhook cactus occurs in two general areas in central Wayne County, Utah and south western Emery County, Utah. Individual populations are small with few scattered plants. The most recent surveys estimate the total number of individuals at 4,500 to 21,000 (USDI-FWS, 2005).



Distribution map of Wright fishhook cactus

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Wright fishhook cactus grows in a range of arid habitats including clay flats in mat saltbush (*Atriplex corrugata*) communities, sandy sites

with galletta grass (*Hilaria jamesii*) and purple three-awn (*Aristida purpurea*), and pinyon-juniper woodlands (*Pinus edulis* and *Juniperus osteosperma*) with a blue grama (*Bouteloua gracilis*) understory (USDI-FWS, 1985).

### **Adaptation**

Unlike many of the other sensitive species of the region, Wright fishhook cactus is not an edaphic specialist, and can be found in a wide variety of soil types and plant communities from fine clay to sand (USDI-FWS, 1985; Welsh et al., 2003). Plants are rare where cryptogamic crusts are damaged or undeveloped (USDI-FWS, 1985). The majority of the known range of Wright fishhook cactus falls in a 15 to 23 cm (6 to 9 in) mean annual precipitation zone (WRCC, 2011).

### **Management**

Wright fishhook cactus is threatened by habitat degradation and plant damage resulting from cattle trampling, ORV use, hiking, mountain biking and other human recreational activities. This species is also targeted by cactus collectors, and illegal collection continues to significantly affect plant reproduction and recruitment (USDI-FWS, 2005).

### **Pests and Potential Problems**

This species is susceptible to infestations of cactus borer beetles (*Moneilema semipunctatum*) (USDI-FWS, 2005). Kass (2001) observed 23 percent of all mortality during a seven year period resulted from cactus borer beetle damage. Blister beetles (*Epicauta* sp.), Ord kangaroo rats (*Dipodomys ordii*), and white-tailed antelope ground squirrels (*Ammospermophilus leucurus*) have also been identified as mortality sources (Kass, 2001).

### **Seed and Plant Production**

Wright fishhook cacti reproduce primarily via seed; however, budding has also been observed.

Plants flower in spring with fruit maturing in June. Specific pollinators are unknown; though ants and beetles have been observed foraging in flowers and may contribute to pollen transfer. Maturing fruits dehisce along a circular horizontal line near or below the middle of the fruit allowing seed dispersal (USDI-FWS, 1985).

### **References**

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- USDI-Fish and Wildlife Service. 1979. Endangered and threatened wildlife and plants; determination that the purple-spined hedgehog cactus and Wright fishhook cactus are endangered species. In: Federal Register. 44(198). 58866-58868.
- USDI-Fish and Wildlife Service. 1985. Wright fishhook cactus recovery plan. Prepared in cooperation with the Wright Fishhook Cactus Recovery Committee. U.S. Fish and Wildlife Service. Denver, Colorado. 27p.
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- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.
- Western Regional Climate Center. 2011. Online. <http://www.wrcc.dri.edu/index.html>. Accessed January 13, 2011.

# Ute Ladies' Tresses

*Spiranthes diluvialis* Sheviak

Plant Symbol=SPDI6  
Listing Status: Threatened



Ute ladies' tresses (*Spiranthes diluvialis*). Photo by Teresa Prendusi, USDA Forest Service

### Alternate Names

*Spiranthes romanzoffiana* var. *diluvialis*

### Uses

Ute ladies'-tresses is a showy, perennial flowering orchid that is difficult to propagate. It was first described by C.J. Sheviak in 1984. Ute ladies'-tresses are found in open wetland and riparian areas and are pollinated mostly by bumblebees (*Bombus* spp.). This species has scientific significance due to its evolutionary isolation, which is an important subject in conservation biology research. It has no known agricultural, economic, or other human uses at this time.

### Status

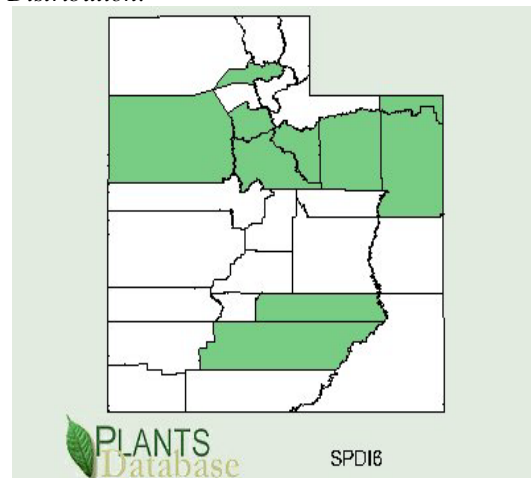
In 1992, Ute ladies' tresses was designated as threatened throughout its range by the U.S. Fish and Wildlife Service. In 2004, USDI-FWS began a 5-year status review to determine if delisting the species was warranted (USDI-FWS, 2004). From 1995 to 2004, the number of known

individuals had increased from 20,500 to approximately 60,000.

### Description

Ute ladies' tresses is a perennial, terrestrial orchid, typically with a single stem, 12-50 cm (5-20 inches) tall, arising from tuberously thickened roots. It has linear-lanceolate leaves, 1 cm (0.4 in) wide and 28 cm (11 in) long which persist during flowering. Basal leaves are the longest and become reduced in size up the stem. The inflorescence consists of few to many white or ivory flowers clustered in a spike of 3-ranked spirals at the top of the stem. The sepals and petals are oriented perpendicular to the stem, the lateral sepals often spreading abruptly from the base of the flower, and all sepals are free to the base. The lip petal is somewhat constricted at the median. Flowering occurs in early August and may persist into early September barring frost or drought. Flowers are faintly fragrant with the scent of coumarin. The seed is ellipsoidal and dust-like, very well adapted to being carried by the wind (Heidel, 1998) (Chelan county 2000) (Montana Field guide 2009).

### Distribution:



Distribution of Ute ladies tresses in Utah

Populations of Ute ladies'-tresses are known from three broad general areas of the interior western United States: near the base of the eastern slope of the Rocky Mountains in southeastern Wyoming and adjacent Nebraska and north central and central Colorado; in the upper Colorado River Basin, particularly the Uinta Basin; and in the Bonneville Basin along the Wasatch Front and westward in the eastern Great Basin, in north-central and western Utah, extreme eastern Nevada and southeastern Idaho. It has also been discovered in southwestern



Montana and in the Okanogan area and along the Columbia River in north-central Washington. Many populations have fewer than 100 individuals, though a couple of populations have over 500 plants (Heidel 1998).

*Habitat:*

Ute ladies' tresses occurs along riparian edges, gravel bars, old oxbows, high flow channels, and moist to wet meadows along perennial streams. It typically occurs in stable wetland and seep areas associated with old landscape features within historical floodplains of major rivers (Heidel 2009). It also is found in wetland and seep areas near freshwater lakes and springs.

**Adaptation**

Ute ladies'-tresses are restricted to a small, sporadic microhabitat represented by calcareous, wet-mesic, temporarily-inundated meadows and shallow wetlands. The shallow meandered wetlands are typically located in alluvial fans that correspond with two uncommon soils series. These microhabitat are temporarily inundated in the spring, often located right below the outer wetland margin. Subsurface hydrological conditions are ameliorated by high organic content at the surface, and coarse alluvial cobble directly below. Water chemistry as inferred from soils data is moderately alkaline and high in calcium carbonate. Soils are loamy calcareous wetland soils with gley features, generally high in micronutrients and organic matter, but are low in phosphorus compared to average values for agricultural soils. The range of pH values for these types of sites in Colorado and Utah is 6.6 to 8.1 and at sites in Nebraska, Wyoming and Montana 7.6-8.2. Most locations of Ute ladies'-tresses are classified as subirrigated ecological sites (Heidel 1998).

**Establishment**

Ute ladies'-tresses is a showy flowering orchid that is difficult to propagate. Efforts are underway by the Denver Botanic Gardens and the Red Buttes Gardens of Salt Lake City to determine if Ute ladies'-tresses can be propagated. The Cincinnati Zoo and Botanical Garden has grown Ute ladies'-tresses from seed. The plant can produce as many as 7,300 tiny seeds per fruit. Seedlings may persist for up to 8 years as subterranean saprophytes dependent on mycorrhizal fungi. Small inconspicuous leaf rosettes may emerge at the end of the growing season and overwinter. Individual plants may flower in consecutive years, or under adverse

environmental conditions may persist below ground with their mycorrhizal symbionts. Reproduction is sexual in the strictest sense, though each year's plant comes from a separate lateral bud. Most orchids produce new tubers every year by lateral buds. There is no evidence that lateral buds produce separate underground shoots leading to new plants, but in collecting voucher specimens, it was observed that the multiple, tuberously-thickened roots have high turgidity and snap easily. Although the majority of plants are single-stemmed, a small number of multi-stemmed plants or small clumps have been noted in sites that were trampled by livestock; this may indicate vegetative reproduction (Heidel 1998).

Ute ladies' tresses exhibits a mixed-mating system. The degree of selfing depends in part upon the abundance of pollinators visiting the flowers. No self-fertile fruit set has been observed, indicating that a pollen vector is required for reproduction. The only pollinator visits observed have been late afternoon visits by bumblebees (*Bombus* spp.) (Sipes, 1995). Bees are provided nectar rewards but the pollen are in masses that are not available to them for food. The distinctive odor of coumarin from the flowers may indicate that there are other rewards to the bumblebee such as critical chemicals for producing pheromones. Other suspected pollinators are anthophorid bees and hawkmoths. Seeds are very short-lived and have a limited time span for germination after seed dispersal. They are generally considered to require endomycorrhizae to germinate in the field. Seeds are very small and require a narrow range of moisture and temperature conditions to germinate, and it is likely they require direct contact with mineral soil (Arft 1998) (Heidel 1998).

**Management**

Modeling of monitored populations in Colorado and Utah project population extinction for almost all of the populations under most agricultural practices. Species' longevity and the primary causes of mortality are unknown. At most observation sites, leaves of Ute ladies'-tresses showed signs of browse by herbivores. Even plants represented by immature rosette leaves under a continuous canopy cover of grass showed signs of browsing on one or more leaves. Livestock grazing takes place at many sites though it tends to be earlier in the growing season when the uplands are still green rather



than during flowering when only the wetlands and riparian areas are green. Vole herbivory of inflorescences at a Colorado site was identified as a significant threat. Land managers should include pollinators and pollen producing plants in their plans to preserve this rare orchid. The effects of pest management programs on bumblebees and the availability of suitable bee nesting habitat should be considered (Szalanski 2001) (Heidel 1998).

### **Pests and Potential Problems**

Besides herbivory, the only other noted observations of pests were weevils browsing some inflorescences in Montana (Heidel 1998).

### **Environmental Concerns**

Genetic divergence among the dispersed populations of Ute ladies'-tresses is low. Thus each population harbors most of the genetic variability found in the species. Therefore, no currently known populations of Ute ladies'-tresses are conservation priorities because of their genetic uniqueness (Heidel 1998).

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## Last Chance Townsendia

*Townsendia aprica* S.L. Welsh & Reveal

**Plant Symbol = TOAP**  
**Listing Status: Threatened**



Last Chance Townsendia (*Townsendia aprica*). Photo by Megan Robinson.

### Alternate Names

Last Chance Townsend daisy

### Uses

Last Chance Townsendia is a recently discovered forb of extremely limited distribution. It has no known human or wildlife associated uses.

### Status

Last Chance Townsendia was listed as a threatened species on August 21, 1985 (USDI FWS 1985). It has been given a recovery priority of 5C indicating a high degree of threat and a low recovery potential (USDI FWS 1993).

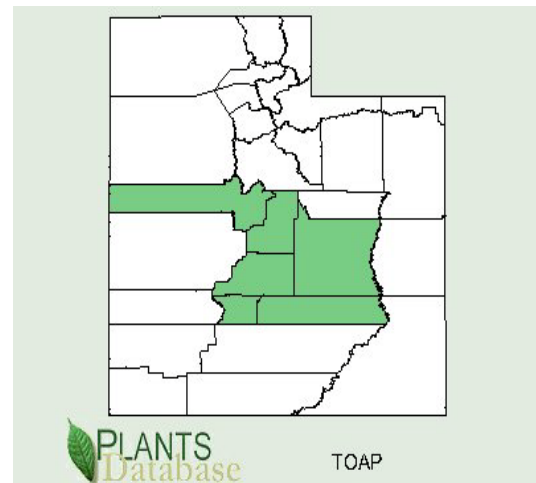
### Description

*General:* Sunflower family (Asteraceae). Last Chance Townsendia is a small mound forming perennial forb. The plant arises from an underground base and branches to form a dense mat from 5 to 10 cm (2 to 4 in) across with the flowering heads formed tight against the leafy mound. The ray flowers (petals) are yellow to golden on the upper surface and purplish and glandular below. The disk flowers are yellow. Achenes are small and hairy with a short pappus of barbed capillary bristles (Welsh et al. 2003). The leaves are hairy, 7 to 13 mm (0.25 to 0.43

in) long and 1 to 3.5 mm (0.04 to 0.14 in) wide and broadest near the tip.

### Distribution:

This species is endemic to a small band about 8 km (5 mi) wide and 48 km (30 mi) long in South Central Utah. Populations are known from the western edge of the San Rafael Swell, west to near Fremont Junction in extreme eastern Sevier county and south to Hartnet Draw in Wayne County. Small isolated populations are known outside of this area of but in close proximity to the main population group. In 1993 there were 15 known populations with an estimated 6,000 individual plants (USDI FWS 1993). Clark and Groebner (2000) reported an additional 11 new populations with approximately 650 total individuals.



Distribution map of last chance Townsendia

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Last Chance Townsendia is known to inhabit saltbush and pinyon-juniper plant communities on clay or clay-silt exposures of the Mancos, Morrison, Summerville and Entrada Formations (USFWS 1993). Species known growing in association with Last Chance Townsendia include galleta (*Hilaria jamesii*), blue grama (*Bouteloua gracillis*), black sagebrush (*Artemisia nova*), shadscale (*Atriplex confertifolia*) and Indian ricegrass (*Achnatherum hymenoides*). Populations occur between 1,800 and 2,400 m (6,000 to 8,000 ft) in elevation (Clark and Groebner 2000).

### **Adaptation**

Last Chance *Townsendia* grows in soils derived from shale lens of the Mancos and other formation with a very fine silt texture that are highly saline or sodic. The unique soil characteristics create small islands of habitable space in vast areas of otherwise uninhabitable soils. These soil conditions have produced habitat for several other endemic plant species growing in the same range as Last Chance *Townsendia* including *Pediocactus despainii*, *Sclerocactus wrightiae*, *Schoenocrambe barnebyi*, *Pediocactus winkleri*, *Gilia caespitosa* and *Gilia tenuis*. All of these species are either listed as federally endangered or as candidate species (USFWS 1993).

### **Establishment**

Last Chance *Townsendia* has been propagated and grown to flower and seed under greenhouse conditions (CPC 2010); however no propagation protocols are available.

### **Management**

The severely limited distribution and range of Last Chance *Townsendia* make it highly vulnerable to a variety of threats. Genetic analysis revealed bottlenecks in more than half of the populations of Last Chance *Townsendia* (Jennings, 2000). The loss of any population would thus be severely detrimental to the overall health of the species. The greatest current threats come from mineral and energy development, road building and livestock trampling (USFWS 1993). Most of the federally owned habitat of Last Chance *Townsendia* is or has been under lease for coal or oil and gas production (USFWS 1993).

Current management strategies for Last Chance *Townsendia* focus on regulating and managing mineral development activities, developing off-road vehicle use plans and managing livestock use of currently occupied *Townsendia* habitat (USFWS 1993).

### **Seed and Plant Production**

Flowering takes place from April to May with fruit and seed ripening occurring from May to June. This species is primarily self-incompatible with outcrossing being the primary means of reproduction (Tepedino et al. 2004). Several native solitary bees have been found to be important pollinators. Multiple species of bees in the genus *Osmia* and the ground-nesting *Synhalonia fulvitaris* were observed as the

primary visitors to Last Chance *Townsendia* flowers (Tepedino et al. 2004).

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# Candidate Species

## Goose Creek Milkvetch

*Astragalus anserinus* N.D. Atwood,  
Goodrich and S.L. Welsh

**Plant Symbol = ASAN7**  
**Listing Status: Candidate**



Goose Creek milkvetch (*Astragalus anserinus*). Photo courtesy of Nevada Natural Heritage Program

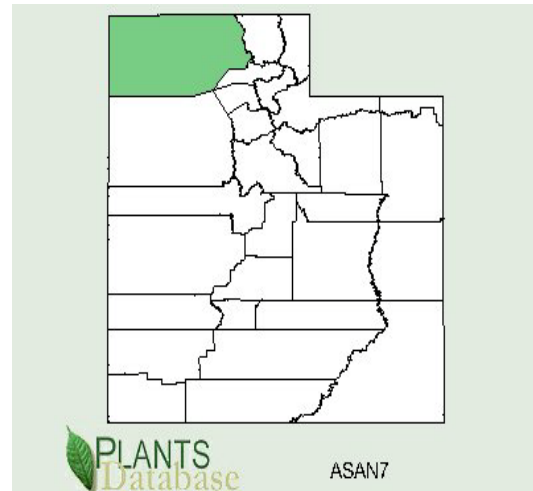
**Alternate Names**  
None

**Uses**  
There are no known human uses of Goose Creek milkvetch. Grazing by rabbits has been observed.

**Status**  
The USDI Fish and Wildlife Service determined in 2007 that Goose Creek milkvetch might be warranted for listing as threatened or endangered and began a status review of the species. In 2009, following a thorough review, USDI-FWS found that listing was warranted, however listing was precluded by higher priority actions (USDI-FWS, 2009). In 2010 the species was officially added to the candidate species list and was assigned a Listing Priority Number (LPN) of 5 due to high magnitude, yet non-imminent threats (USDI-FWS, 2010).

**Description**  
*General:* Legume family (Fabaceae). Goose Creek milkvetch is a mat-forming perennial forb arising from a narrow taproot. The stems are 3 to 11 cm (1.2 to 4.3 in) long and lay prostrate on the ground. The leaves are pinnately compound with 5 to 15 woolly tomentose leaflets. Each leaflet is 3 to 7 mm (0.12 to 0.28 in) long and oval in shape. The flowers are 9 to 11 mm (0.35 to 0.43 in) long, pinkish purple and borne in clusters of 3 to 7 flowers per stem. The fruit is a claw shaped pod, 9 to 12 mm (0.35 to 0.47 in) long and 5 to 7 mm (0.20 to 0.28 in) wide, with 16 to 20 ovules (Welsh et al., 2003).

**Distribution:**  
Goose Creek milkvetch occupies an area approximately 32.5 km (20 mi) long and 6.4 km (4 mi) wide where the Idaho, Nevada, and Utah borders meet. Known populations occur in the Goose Creek drainage in Cassia County, Idaho; Elko County, Nevada; and Box Elder County, Utah (USDI-FWS, 2009). There were an estimated 60,000 plants prior to 2007 when wildfires burned much of the known habitat. Accurate counts of Goose Creek milkvetch are complicated due to variability in annual abundance.



For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

**Habitat:**  
Goose Creek milkvetch occurs from 1,500 to 1,790 m (4,920 to 5,870 ft) elevation in sagebrush steppe plant communities. It can be found growing in association with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), Utah juniper (*Juniperus osteosperma*), green rabbitbrush (*Chrysothamnus viscidiflorus*), Sandberg bluegrass (*Poa secunda*), and needleandthread (*Heterostipa comata*).

**Adaptation**  
Goose Creek milkvetch grows primarily on tuffaceous (a rock composed of the finer kinds of volcanic detritus usually fused together by heat) outcrops of the Salt Lake Formation in silty to gravelly sandy loam soils. The region of the Goose Creek drainage receives 23 to 30 cm (9 to 12 in) of annual precipitation (USDI-FWS, 2010).

### **Management**

Management and protection of this species should be centered on habitat protection, especially against invasion of cheatgrass (*Bromus tectorum*) and protection from wildfires.

The USDI-FWS has identified several threats to Goose Creek milkvetch. In 2007, wildfire severely impacted known populations of Goose Creek milkvetch. The threat of fire is increasing due to continued invasion of annual weeds including cheatgrass. Establishment of high densities of cheatgrass is known to increase the fire return interval, making more habitat loss from fire likely. Cheatgrass and other weeds such as leafy spurge (*Euphorbia esula*) are also known to compete directly with Goose Creek milkvetch; however, control efforts to date have been largely successful in keeping weed invasion limited (USDI-FWS, 2009). Much of the nearby habitat of Goose Creek milkvetch has been altered as a result of intentional seeding of crested wheatgrass (*Agropyron cristatum*); however Goose Creek milkvetch's primary habitat of steep slopes and rock composed of the finer kinds of volcanic detritus seems to preclude it from direct competition with crested wheatgrass. Habitat degradation from cattle grazing and development of livestock watering facilities also pose a threat to this species.

### **Pests and Potential Problems**

There are no known potential problems from disease, insects or fungi associated with Goose Creek milkvetch.

### **Environmental Concerns**

There are no known environmental concerns associated with Goose Creek milkvetch.

### **Seed and Plant Production**

Goose Creek milkvetch plants flower from late May to early June with fruit set in early June. Pollination and seed dispersal mechanisms are unknown.

### **References**

- U.S. Fish and Wildlife Service. 2009. Endangered and threatened wildlife and plants; 12-month finding on a petition to list *Astragalus anserinus* (Goose Creek milkvetch) as threatened or endangered. In: Federal Register. 74(174): 46521-46542.
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- Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. *A Utah Flora*. Third Edition, revised. Brigham Young University, Provo, UT.



## White River Penstemon

*Penstemon scariosus* Pennell var. *albifluvis* (England) N.H. Holmgren

**Plant Symbol = PESCA**  
**Listing Status: Candidate**



White River penstemon (*Penstemon scariosus* var. *albifluvis*). Photo by Carol Dawson

### Alternate Names

*Penstemon albifluvis*  
White River beardtongue

### Uses

There are no known human uses of White River penstemon. It is highly palatable to livestock and wildlife (USDI-FWS, 2010).

### Status

White River penstemon is currently a candidate for Federal protection following its official proposal in 1983. It is currently protected on USDI-BLM lands from development within its habitat. It has a listing priority of 9, moderate magnitude of an imminent threat, primarily from oil and gas exploration (USDI-FWS, 2010).

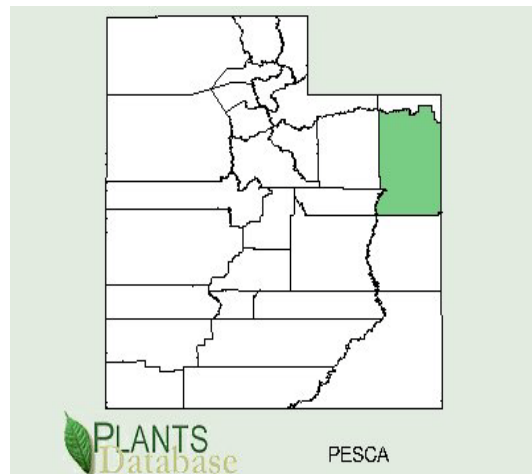
### Description

*General:* Figwort family (Scrophulariaceae). White River penstemon is a herbaceous perennial forb with multiple stems arising from a woody root crown. Mature plants are approximately 15 to 50 cm (6 to 20 in) tall. Leaves are opposite, linear to linear-lanceolate, 3 to 17 cm (1.2 to 6.7 in) long and 2 to 23 mm (0.08 to 0.91 in) wide. The inflorescence is a glandular-pubescent, congested raceme bearing pale blue to lavender flowers. The flower is

comprised of five petals fused to form a bilateral tube approximately 20 to 22 mm (0.79 to 0.87 in) long. The staminode (sterile stamen) is 9 to 10 mm (0.35 to 0.4 in) long, and the fertile stamens are 10 to 11 (0.4 to 0.43 in) long. The anther sacs are dark blue, 1.3 to 2.6 mm (0.05 to 0.10 in) long, and moderately bearded with white slender flexuous hairs. The anther sacs dehisce nearly the full length, except across the center connective tissue (Welsh et al., 2003). The fruit is a capsule; 8 to 11 mm (0.31 to 0.43 in) long bearing 10 to 20, 2 mm (0.08 in) long seeds (USDI-FWS, 2010). Flowering occurs in May and early June, with fruiting and seed set in late June (Lewinsohn and Tepedino, 2007).

### Distribution:

White River penstemon occurs in 15 sites forming an arc from Rio Blanco County, Colorado west of Rangely, Colorado and westward into southern Uintah County, Utah. Total area occupied by known populations is approximately 200 acres (USDI-FWS, 2010). Approximately 70 percent of White River penstemon habitat is located on public lands managed by the USDI-BLM.



Distribution of White River penstemon in Utah

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

White River penstemon grows in mixed desert shrub and pinyon-juniper communities on sparsely vegetated shale slopes. Plants growing in association with this species include shadscale (*Atriplex confertifolia*), yellow rabbitbrush (*Ericameria viscidiflorus*), Salina wildrye (*Elymus salinus*) Indian ricegrass (*Achnatherum hymenoides*), pinyon pine (*Pinus edulis*) and

Utah juniper (*Juniperus osteosperma*) (USDI-FWS, 2010; Welsh et al., 2003).



White River penstemon in its native habitat. Photo by Ben Franklin

### Adaptation

White River penstemon is endemic to oil shale barrens of the Green River Formation in the Uinta Basin in Utah and Colorado from 1525 to 2075 m (5,000 to 6,800 ft) (USDI-FWS, 2010). The soils are calcareous, often white or red, fine textured and mixed with shale. The range of this species is found in a 13 to 23 cm (6 to 12 in) precipitation zone (WRCC, 2011).

### Management

The greatest potential threat to White River penstemon is oil and gas development. Habitat disturbance from off road vehicle (ORV) use and trampling from cattle and sheep may be a factor, but these effects have not been sufficiently monitored (USDI-FWS, 2010).

White River penstemon is currently a BLM special status species, which offers some protection against oil and gas development in a portion of its range.

### Pests and Potential Problems

White River penstemon is palatable to wildlife and livestock, and some herbivory has been documented.

### Environmental Concerns

Climate change could negatively impact this and other species with restricted distributions.

### Seed and Plant Production

Although this species is self-compatible, pollinators are required for maximum seed production. The flowers are primarily visited by native, solitary bees including *Anthophora* spp., *Ceratina* spp., *Dialictus* spp., *Halictus* spp., and *Osmia* spp. In field surveys, Lewinsohn and Tepedino (2007) identified 12 bee species visiting White River penstemon, two of which were potentially undescribed species. Of the ten identified species, only one was considered a penstemon specialist.

### References

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- Western Regional Climate Center. 2011. Online. <http://www.wrcc.dri.edu/index.html>. Accessed January 13, 2011.

## Gierisch Mallow

*Sphaeralcea gierischii* N.D. Atwood  
and S. Welsh

**Plant Symbol = SPGI2 (unofficial)**

**Listing Status: Candidate**



Gierisch mallow (*Sphaeralcea gierischii*). Photo courtesy of USID-FWS

### Alternate Names

Gierisch's globemallow

### Uses

There are no known human uses of Gierisch mallow. It is palatable to livestock and wildlife, especially in drought years when other forages are reduced or unavailable (USDI-FWS, 2010).

### Status

Gierisch mallow became a candidate for federal protection in 2008 (USID-FWS, 2008). Listing is considered warranted; however, higher priority listing actions have precluded the proposed and final listing rules for the species (USDI-FWS, 2010). The species has a listing priority of 2 (high magnitude with imminent threat).

### Description

*General:* Mallow family (Malvaceae). Gierisch mallow is a perennial forb growing from a woody caudex, with the inflorescence reaching 40 to 100 cm (16 to 39 in) tall. The stems are often dark reddish purple. The leaves are 3 to 5 lobed, bright green, and oval shaped in outline. The leaf base is often heart shaped. The blades are 1.2 to 4 cm (0.5 to 1.6 in) long and 1 to 5 cm (0.4 to 2.0 in) wide. The flowers are large with orange petals, 15 to 25 mm (0.6 to 1.0 in) long (Welsh et al., 2003).

### Distribution:

Gierisch mallow is known from nine populations totaling approximately 60 acres. Eight populations are located in northern Mohave County, Arizona, and one population is in Washington County, Utah. There are between 7,000 and 12,000 individuals in Arizona, and the Utah population is believed to be approximately 5,000 to 8,000 individuals (USDI-FWS, 2010).

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Habitat:

Gierisch mallow is found in warm desert shrub plant communities of the northern Mohave Desert at approximately 1,090 m (3,576 ft) (Welsh et al., 2003).

### Adaptation

Gierisch mallow is an obligate gypsophile (a plant limited to gypsum based soils) restricted to outcrops of the Harrisburg Member of the Kaibab Formation. The area receives approximately 13 to 20 cm (5 to 8 in) of annual precipitation (WRCC, 2011).

### Management

Gierisch mallow is threatened by habitat destruction due to gypsum mining, and habitat degradation from off road vehicle (ORV) use and livestock grazing. Habitat for Gierisch mallow continues to be destroyed by gypsum mining, and reclaimed sites following mining activities may not provide suitable habitat.

### Pests and Potential Problems

Gierisch mallow is palatable to wildlife and livestock. The flowering stems are grazed primarily in drought years, reducing seed production and recruitment opportunities (USDI-FWS, 2010).

**Environmental Concerns**

Climate change could negatively impact this and other species with restricted distributions.

**Seed and Plant Production**

Life history and germination studies are needed for this species. Reproduction, pollination systems and seed dispersal mechanisms are unknown.

**References**

USDI- Fish and Wildlife Service. 2008. Endangered and threatened wildlife and plants; review of native species that are candidates for listing as endangered or

threatened; annual notice of findings on resubmitted petitions; annual descriptions of progress on listing actions. In: Federal Register. 73(238): 75176-75178.

USDI-Fish and Wildlife Service. 2010. Species assessment and listing priority assignment for Gierisch mallow (*Sphaeralcea gierischii*). U.S. Fish and Wildlife Service. Albuquerque, New Mexico. 12p.

Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Third Edition, revised. Brigham Young University, Provo, UT.

Western Regional Climate Center. 2011. Online. <http://www.wrcc.dri.edu/index.html>. Accessed January 13, 2011.

**Visit the following websites to learn more about these plant species**

**<http://www.fws.gov/utahfieldoffice/index.html>**

**<http://www.utahrareplants.org/>**

**<http://www.centerforplantconservation.org/>**

**and**

**<http://plants.usda.gov/>**

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