# Rare Plant Status, Survey and Monitoring
# San Juan Public Lands 2009

**Prepared for San Juan Public Lands**

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Knowledge to Go Places

# Executive Summary

Work by CNHP in 2009 included detailed mapping and assessment *of Cryptantha gypsophila, Gutierrezia elegans* and *Physaria pulvinata*; monitoring of four other rare plants; and providing a report on 79 special status species of the San Juan Public Lands (in this document). Other tasks in 2009 included preparing profiles of each special status species; modeling of predicted habitat for three species; and preparing data from fen surveys for inclusion in CNHP data bases.

## Acknowledgements

Thanks to Jeff Redders and Cara MacMillan of the San Juan Public Lands for their continued support of rare plant work; and to our helpers Rick Lyon and George Huggins (spouses); and Ellen Mayo and Gina Glenne of the US Fish and Wildlife Service. Thanks to Colorado Natural Areas Program for funding detailed mapping of *Cryptantha gypsophila* and *Physaria pulvinata.* And thanks to Colorado State University for underwriting our student intern, Dawson White.

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## Chapter I. Detailed mapping and assessment of *Physaria pulvinata* and *Gutierrezia elegans* at Plateau Creek and *Cryptantha gypsophila* at Big Gypsum Valley.

### *Physaria pulvinata*

**Methods:** The rough polygon established in 2006 on Forest Road 514 (T39N, R15W Section 1) was redrawn in 2009. In order to achieve a more accurate assessment of the population size, groups of plants, occurring on knolls separated by small drainages were flagged with pin flags, the perimeter of each patch was entered in GPS receivers, and all individuals in each polygon were counted.

**Results:** A total of 5,104 individual plants was counted. The resulting map is shown in Figure 1. These will be entered in the CNHP database as one polygon. Counts of the 22 individual polygons are given in Table 1.

**Discussion:** By doing a complete census of this area, our assessment of the population size was greatly increased, from an estimate of 1,700 to a count of over 5,000.

**Table 1. Counts of individual *Physaria pulvinata* polygons.**

| POLY_NO | NUM_INDIV |
|---|---|
| 1 | 97 |
| 2 | 45 |
| 3 | 160 |
| 4 | 38 |
| 5 | 22 |
| 6 | 2 |
| 10 | 8 |
| 11 | 1 |
| 12 | 349 |
| 17 | 337 |
| 18 | 144 |
| 19 | 300 |
| 20 | 317 |
| 21 | 545 |
| 22 | 198 |
| 23 | 484 |
| 24 | 394 |
| 25 | 153 |
| 26 | 38 |
| 28 | 199 |
| 29 | 730 |
| 30 | 543 |

## *Cryptantha gypsophila*

**Methods:** The rough polygon established in 2006 at the west end of Big Gypsum Valley was redrawn in 2009. The perimeters of five groups of plants, occurring on knolls separated by small drainages, were flagged with pin flags, and all individuals in each polygon counted. Average density of these 5 plots was estimated to be 3.5 individuals per square meter. Additional polygons were mapped with GPS but not counted, and the average density applied to give an overall estimate of the population size of approximately 20,000 to 30,000 individuals.

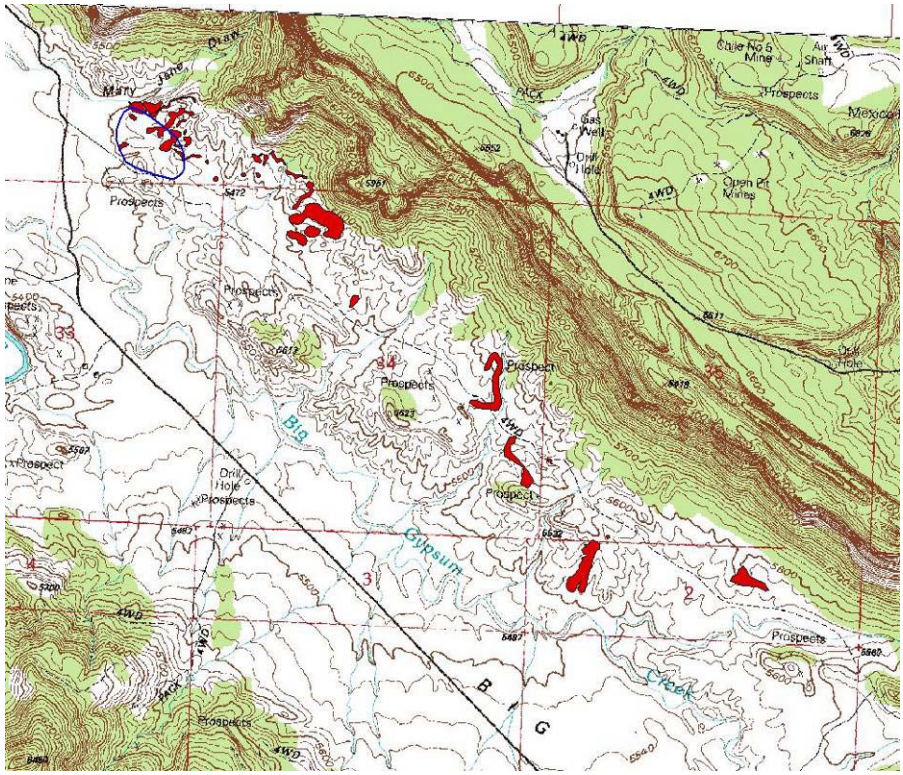



**Figure 2. Revised map of *Cryptantha gypsophila* at Big Gypsum Valley.**

**Blue polygon at north end is originally mapped area.**

## *Gutierrezia elegans*

**Methods:** Detailed mapping was done for all *Gutierrezia elegans* plants found on the San Juan National Forest in the Plateau Creek area. The perimeter of each sub-population was flagged with pin flags, then mapped with GPS, and individuals within each were counted or estimated (Figure 3, Table 2.)

**Results:** Nineteen new polygons were added to the single polygon previously mapped. The total estimated number of individuals on the Forest was estimated at 4,895. Occurrence records were entered in the CNHP database.

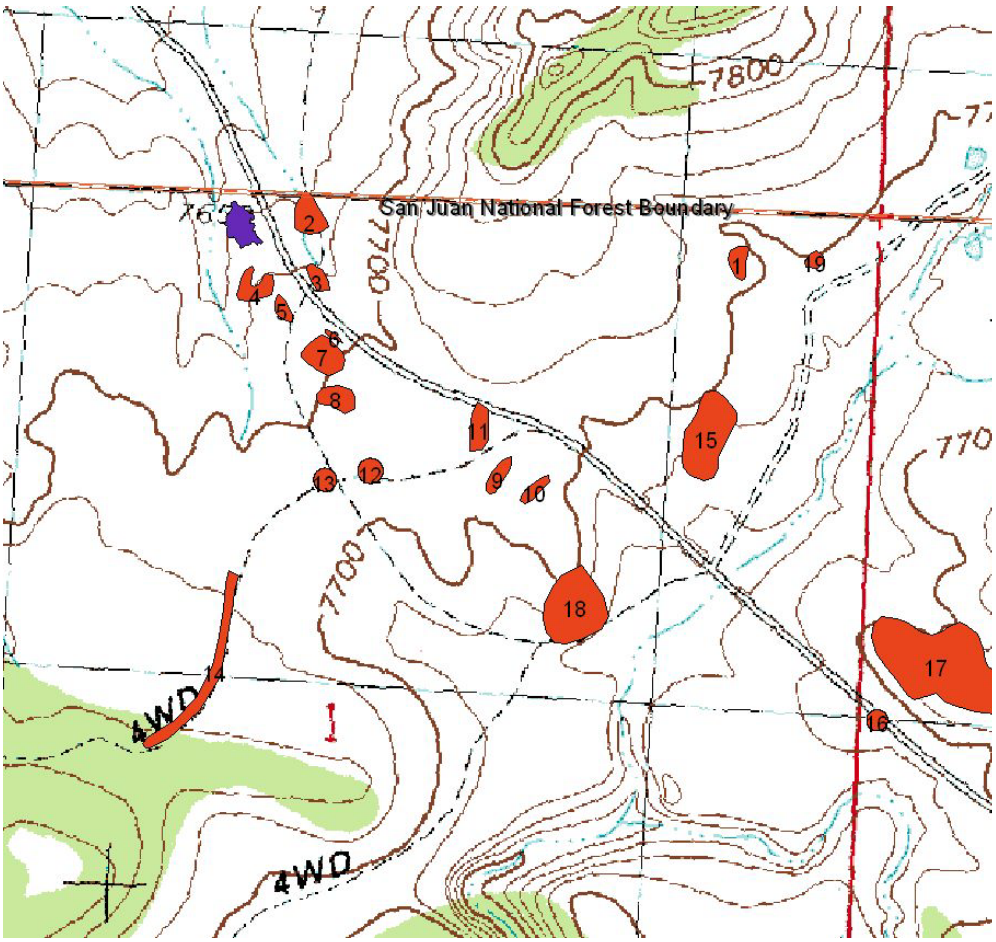



**Figure 3. *Gutierrezia elegans* locations on San Juan NF at Plateau Creek. Blue polygon is area mapped in 2008; red mapped in 2009. See Table 2 for count or estimates for each polygon.**

**Discussion:** Confidence that all occurrences on the Forest were mapped is high. Counts of individual polygons can be used to track changes in the population size.

**Table 2. Counted and estimated number of individuals in detailed map area.**

| Polygon number | Waypoint numbers | Counted individuals | Estimated individuals | Acres |
|---|---|---|---|---|
| 1 | 232-242 | 111 | 120 | 0.028 |
| 19 | 394-399 | 20 | 20 | 0.013 |
| 2 | 376-385 | 182 | 200 | 0.054 |
| 3 | 385-392 | 46 | 50 | 0.021 |
| 4 | 393-399 | 226 | 250 | 0.041 |
| 5 | 400-403 | 163 | 180 | 0.017 |
| 6 | 404-410 | 85 | 100 | 0.004 |
| 7 | 411-418 | 431 | 500 | 0.062 |
| 8 | 419-427 | 267 | 300 | 0.042 |
| 9 | 428-430 | | 100 | 0.025 |
| 10 | 431-432 | | 75 | 0.019 |
| 11 | 433-438 | 107 | 130 | 0.042 |
| 12 | 439 | | 100 | 0.027 |
| 13 | 440 | | 100 | 0.023 |
| 14 | 441-443 | | 400 | 0.113 |
| 15 | 444-468 | | 800 | 0.171 |
| 16 | 3 new | | 70 | 0.019 |
| 17 | 4-48 new | | 700 | 0.462 |
| 18 | 470-484 | | 700 | 0.193 |

Total estimate: 4895

## Additional surveys in the Boggy-Glade area

**Methods:** Both "windshield" and on the ground surveys were conducted in the area known as "Boggy-Glade" (Figure 3). Primary targeted species were *Physaria pulvinata* and *Gutierrezia elegans*, both of which occur on barren shale areas or with black sagebrush (*Artemisia nova*). Barren areas were identified both from aerial photos and on the ground, and then field checked for special status species. Species lists were prepared at selected sites (Appendix II).

**Results:** *Gutierrezia elegans* was found to extend somewhat beyond the known area, and was mapped in detail (see above). No occurrences of either species were found away from the Plateau Creek area. Areas covered are shown in Figure 4.

**Figure 3 Location of "Boggy-Glade" in San Juan NF**

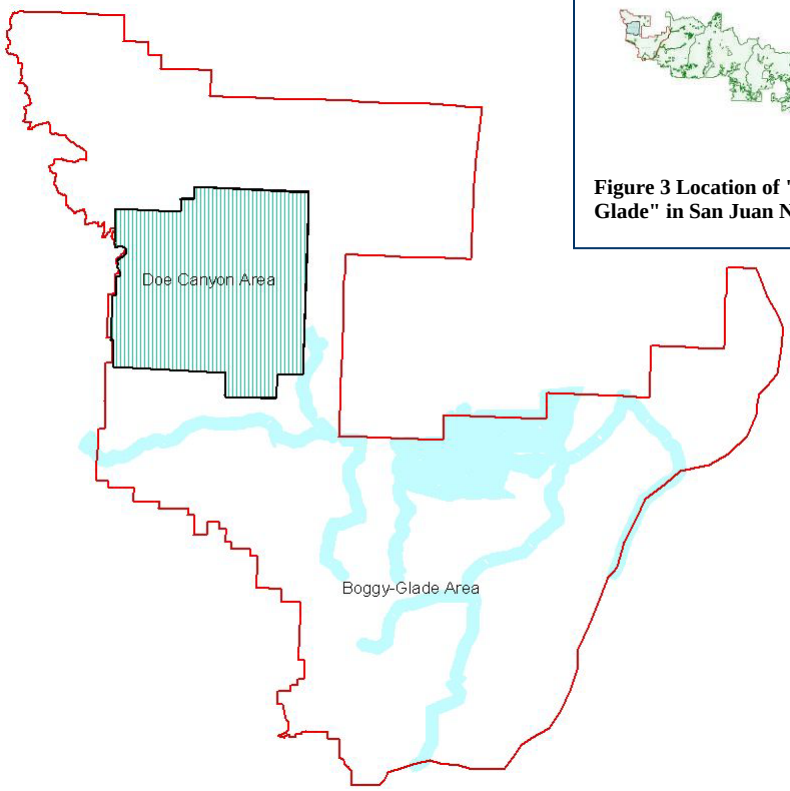



**Figure 4. Areas surveyed 2009 (blue lines).**

***Gutierrezia elegans* at the Glade?**

A reported occurrence of *Gutierrezia elegans* at The Glade, near Beef Trail Reservoir was investigated. Although the plants there were very similar to the type specimen from Lone Mesa State Park, there were some differences, leaning toward the more common *G. sarothrae*; namely that the leaves were somewhat narrower and longer and the heads not as large as the Lone Mesa plants. A specimen from the Glade location was sent to expert Guy Neesom, one of the original authors of the species. His opinion was that it is probably *G. sarothrae*. Hybridization is not known in this genus. The Forest's decision to manage the site as though *G. elegans* were present seems reasonable for the present. It is planned that more material will be collected and compared in 2010.

***Physaria cnema***

Another recently discovered species, *Physaria cnema*, is known to occur on the Forest, and was originally slated for survey in 2009. However, the species has not yet been officially published, and DNA research is being conducted to verify whether it is a good species. Therefore, additional survey for that species was halted after a few sites had been mapped. Our initial impression is that it is fairly abundant on the Forest and adjacent State Park and State Land Board properties. If it is published by the 2010 field season, survey will be resumed.

## Chapter II. Rare Plant Monitoring

Monitoring continued with re-visits to four sites that were established in 2007 and 2008 (Lyon 2008). These were:

***Draba smithi*** **(EOR #18)**
***Lesquerella pruinosa*** **(EOR # 2)**
***Astragalus missouriensis*** **(EOR #2)**
***Epipactis gigantea*** **(EOR #9)**

## *Astragalus missouriensis* ssp. *humistratus*
## (EOR 2)
## Monitoring at Eight Mile Mesa Road

M**ethods:** The transect established in 2007 was still in place, with intact rebar.
A meter tape was stretched between the two pieces of rebar, and parallel tapes run 3.5 m from the center line, forming two plots 16 X 3.5 m. All *A. missouriensis* plants were counted, whether in flower, fruit or vegetative.

**Results:**
West side of transect: 32 (53 in 2007)
East side: 80 (85 in 2007)
Total: 112 (128 in 2007)

**Discussion:** This is a 12% decrease from 2007. There was no apparent explanation for the difference. The site did not appear to have been disturbed. However, with a short-lived species such as this, annual fluctuation in numbers is not surprising.

## *Lesquerella pruinosa* (EOR 2), Eight Mile Mesa Road
## June 1, 2009

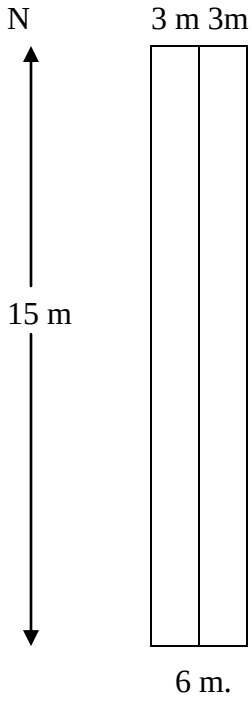
**Methods:** In 2009 the rebar installed in 2007 was no longer in place, so it was not possible to compare the number of individuals between 2007 and 2009. A new 15 m transect was established nearby, on more level ground where the rebar would be less likely to be removed by erosion. The width of the plot was increased from 4 m in 2007 to 6 m in 2009, to include more individuals.

End points of the new transect center line were at (Zone 13, NAD 83):
N: 325443 E; 4117502 N
S: 325444 E; 4117490 N

**Results: Count in 2009:**
West side: fruiting 19; vegetative 54
East side: fruiting 47, vegetative 50
Total: 170 individuals

(Total count in 2007 was 52)

Diagram of plot for *Lesquerella pruinosa* monitoring.




**Discussion:** The new transect, having more than three times the number of individuals as the 2007 transect, should give a more accurate picture of any change in population size over several years. As in 2007, any trend cannot be extrapolated to reflect the population as a whole, but is meaningful only for this transect.

# *Draba smithii* monitoring at East Fork, San Juan River (EOR 18)
## June 1, 2009

**Methods:** Photographs and measurements were taken of the same clumps that were photographed in 2007, and compared. (See Table 3 and Appendix I for photos).

**Results**: In general, the population appears to be doing well. Comparing ten clumps, eight growing on the cliffside and two on the ground that could fairly confidently be matched up, there was an increase in total area covered of 407 square cm. Four showed a decrease, while 6 showed an increase in area.

One large clump growing on the ground at the base of the cliff (#14) was considerably smaller in 2009, with a decrease in area from 9000 to 57 square cm. and is not included in the total above. This decrease appears to be a result of competition from other plants, especially willow, and damage from falling debris. The photos and our personal observations also show that there is more debris and competing vegetation at the site in 2009 than in 2007 (Figure 3).

A comparison of number of flowering stems showed a decrease from 2007, from >121 to 48. This may be due to the earlier survey date (June 13, 2007 vs. June 1, 2009). Total number of flowering stems cannot be directly compared, since not all stems were

counted. However seven of the 10 clumps showed a decrease, one stayed the same, and two had an increase.

**Comments:** Repeating the methods designed in 2007 proved to be more difficult than we had anticipated. Since in 2007 we were unable to install any permanent identification aids, we used materials at hand (a deck of playing cards) to identify individual clumps of plants. Some photos could be matched up in 2009, especially where there were obvious similarities in the rocks in the background. Others had no satisfactory match.

**Figure 5. Clump number 14, 2007. 100 x 90 cm, >100 fl stems**

**Figure 6. Clump number 14, 2009. 75 x 76 cm, >100 fl stems. Note debris covering plants.**

**Table 3. *Draba smithii* comparison 2007-2009**

| Clump number | 2007 length | 2007 width | 2007 area | 2009 length | 2009 width | 2009 area | difference in area | number of flowering stems 2007 | number of flowering stems 2009 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 11 | 10 | 110 | 9 | 12 | 108 | <2) | 1 | 1 |
| 2 | 15 | 20 | 300 | 23 | 20 | 460 | 160 | >20 | 1 |
| 3 | 6 | 7 | 42 | 9 | 11 | 99 | 57 | 9 | 2 |
| 4 | 20 | 6 | 120 | 26 | 14 | 364 | 244 | 0 | 1 |
| 5 | 17 | 10 | 170 | 9 | 5 | 45 | <125> | 7 | 0 |
| 6 | no match | - | - | - | - | - | - | - | - |
| 7 | 7 | 21 | 147 | 20 | 22 | 440 | 293 | >20 | 6 |
| 8 | 14 | 27 | 378 | 15 | 13 | 195 | <183> | >20 | 12 |
| 9 | no match | - | - | - | - | - | - | - | - |
| 10 | no match | - | - | - | - | - | - | - | - |
| 11 | 32 | 48 | 1536 | 40 | 35 | 1400 | <136) | >20 | 4 |
| 12 | 33 | 30 | 990 | 32 | 27 | 999 | 9 | 4 | 13 |
| 13 | no match | - | - | - | - | - | - | - | - |
| 14 | 100 | 90 | 9000 | 75 | 76 | 5700 | | >100 | >100 |
| 15 | no match | - | - | - | - | - | - | - | - |
| 16 | no match | | - | - | - | - | - | - | - |
| 17 | no match | - | - | - | - | - | - | - | - |
| 18 | 42 | 33 | 966 | 44 | 24 | 1056 | 90 | >20 | 8 |
| total | | | | | | | 407 without #14 | >121 | 48 |

# *Epipactis gigantea* monitoring at First Fork Road, Piedra
## (EOR 9)
## June 1, 2009

**Methods/Results:** Only observational monitoring was done in 2009, because plants were too numerous to count. They were as or more abundant than in 2007. They were especially dense in the northwest corner of the plot. Because the ground is very wet, it is not practical to install any permanent monuments. It is recommended that future monitoring be observational.

## Chapter III. Status report on all special status plants of San Juan Public Lands

The CNHP database, updated to December 2009, was utilized to prepare the following tables. Table 4 shows the relative importance in Colorado of each special status species found on San Juan Public Lands, based on the number of occurrences and the percent of Colorado occurrences that are on the SJPL. Note that several species are known in Colorado only from the SJPL. Table 5 shows the monitoring status of all special status species. Table 6 lists all San Juan Public Lands Element Occurrences with a last observation date greater than 10 years ago **and** are BLM or Forest Service sensitive. These are recommended as the top priority occurrences for updating. (See also GIS shape files provided). Table 7 lists all occurrences over 10 years old. Table 8 lists all occurrences over 5 years old. All tables in this chapter are also provided in Excel format.

**Table 4. All San Juan Special Status Plants by Species, with percent of Colorado occurrences on San Juan Public Lands**

| Global name | Global rank | State rank | Number EORs on SJPL | Number EORs in Colorado | % CO EORs on SJPL | BLM sensitive | FS sensitive | BLM highlight | FS Highlight |
|---|---|---|---|---|---|---|---|---|---|
| *Acarospora nodulosa* var. *nodulosa* | G5T4? | S1 | 3 | 3 | 100 | | | x | |
| *Aliciella sedifolia* | G1 | S1 | 0 | 2 | 0 | x | | | |
| *Aralia racemosa* | G4G5 | S1 | 4 | 4 | 100 | | | | x |
| *Artemisia pygmaea* | G4 | S1 | 2 | 6 | 33 | | | x | |
| *Asplenium trichomanes-ramosum* | G4 | S1S2 | 2 | 5 | 40 | | | | x |
| *Astragalus deterior* | G1G2 | S1S2 | 1 | 15 | 7 | | | x | |
| *Astragalus humillimus* | G1 | S1 | 0 | 4 | 0 | | | | |
| *Astragalus iodopetalus* | G2 | S1 | 1 | 4 | 25 | | | | x |
| *Astragalus missouriensis* | G5T1 | S1 | 7 | 10 | 70 | | x | | |

| Global name | Global rank | State rank | Number EORs on SJPL | Number EORs in Colorado | % CO EORs on SJPL | BLM sensitive | FS sensitive | BLM highlight | FS Highlight |
|---|---|---|---|---|---|---|---|---|---|
| var. *humistratus* | | | | | | | | | |
| *Astragalus naturitensis* | G2G3 | S2S3 | 11 | 40 | 28 | x | | | |
| *Astragalus proximus* | G4 | S2 | 6 | 13 | 46 | | x | | |
| *Astragalus schmolliae* | G1 | S1 | 0 | 6 | 0 | | | | |
| *Astragalus tortipes* | G1 | S1 | 0 | 2 | 0 | | | | |
| *Bupleurum americanum* | G5 | S1 | 1 | 1 | 100 | | | | x |
| *Calochortus flexuosus* | G4 | S2 | 2 | 16 | 13 | | x | x | |
| *Carex diandra* | G5 | S1 | new | 8 | ? | | | | |
| *Carex oreocharis* | G3 | S1 | 1 | 10 | 10 | | | | x |
| *Carex retrorsa* | G5 | S1 | 5 | 7 | 71 | | | | x |
| *Carex viridula* | G5 | S1 | 3 | 11 | 27 | | | x | x |
| *Castilleja lineata* | G4? | S1 | 1 | 4 | 25 | | | | x |
| *Comarum palustre* | G5 | S1S2 | 1 more? | 18 | 5? | | | | x |
| *Commelina dianthifolia* | G5 | S1? | 1 | 8 | 13 | | | | x |
| *Cryptantha gypsophila* | G1G2 | S1S2 | 13 | 16 | 81 | x | | | |
| *Cryptogramma stelleri* | G5 | S2 | 5 | 18 | 28 | x | | | |
| *Cypripedium parviflorum* | G5 | S2 | 3 | 29 | 10 | | x | | |
| *Cystopteris montana* | G5 | S1 | 2 | 11 | 18 | | | | x |
| *Descurainia kenheilii* | G1 | S1 | 1 | 1 | 100 | | | | |
| *Draba borealis* | G4 | S2 | 5 | 14 | 36 | | | x | x |
| *Draba graminea* | G2 | S2 | 16 | 25 | 64 | | | x | x |
| *Draba malpighiacea* | G1 | S1 | ? | ? | ? | | | | |

| Global name | Global rank | State rank | Number EORs on SJPL | Number EORs in Colorado | % CO EORs on SJPL | BLM sensitive | FS sensitive | BLM highlight | FS Highlight |
|---|---|---|---|---|---|---|---|---|---|
| *Draba porsildii* | G3G4 | S1 | 1 | 15 | 7 | | | x | x |
| *Draba smithii* | G2 | S2 | 1 | 28 | 4 | | x | | |
| *Drosera anglica* | G5 | S1 | 1 | 1 | 100 | | x | | |
| *Epipactis gigantea* | G4 | S2 | 3 | 35 | 9 | | x | | |
| *Equisetum variegatum* | G5 | S1 | 3 | 7 | 43 | | | | x |
| *Erigeron kachinensis* | G2 | S1 | 1 | 2 | 50 | x | | | |
| *Erigeron philadelphicus* | G5 | S1 | 1 | 7 | 14 | | | | x |
| *Eriophorum altaicum* var. *neogaeum* | G4?T3T4 | S3 | 21 | 36 | 58 | | x | | |
| *Eriophorum chamissonis* | G5 | S1 | 1 | 9 | 22 | | x | | |
| *Eriophorum gracile* | G5 | S2 | 0 | 17 | 0 | | | | |
| *Festuca arizonica* | NA | | na | | | | | | |
| *Gilia haydenii* | G3 | S2 | 3 | 11 | 27 | x | | | |
| *Gutierrezia elegans* | G1 | S1 | 1 | 3 | 33 | x | x | | |
| *Gypsoplaca macrophylla* | G3G4 | S1 | 2 | 3 | 67 | | | x | |
| *Hackelia gracilenta* | G1 | S1 | 1 | 10 | 10 | | | x | |
| *Hamatocaulis vernicosus* | G5 | S2 | new | | | | | | |
| *Iliamna grandiflora* | G3?Q | S1 | 2 | 14 | 14 | | | x | |
| *Ipomopsis polyantha* | G1 | S1 | 1 | 3 | 33 | | x | | |
| *Lecanora gypsicola* | G1 | S1 | 3 | 3 | 100 | | | x | |
| *Lesquerella pruinosa* | G2 | S2 | 4 | 17 | 24 | x | x | | |
| *Listera borealis* | G4 | S2 | 1 new | 24? | 4 | | | | |
| *Machaeranthera* | G2 | S2 | 10 | 31 | 32 | | x | | |

| Global name | Global rank | State rank | Number EORs on SJPL | Number EORs in Colorado | % CO EORs on SJPL | BLM sensitive | FS sensitive | BLM highlight | FS Highlight |
|---|---|---|---|---|---|---|---|---|---|
| *coloradoensis* | | | | | | | | | |
| *Mimulus eastwoodiae* | G3G4 | S1 | 2 | 15 | 13 | x | | | |
| *Parnassia kotzebui* | G5 | S2 | 0 | 15 | 0 | | | | |
| *Pediocactus knowltonii* | G1 | S1 | 0 | 1 | 0 | | | | |
| *Pediomelum aromaticum* | G3 | S2 | 1 | 19 | 5 | x | | | |
| *Penstemon breviculus* | G3 | S2 | 8 | 24 | 33 | | | x | |
| *Physaria cnema* | NR | | na | | | | | | |
| *Physaria pulvinata* | G1 | S1 | 2 | 5 | 40 | | x | x | |
| *Physaria scrotiformis* | G1 | S1 | new | | | | | | |
| *Pinus ponderosa* | NA | | na | | | | | | |
| *Pinus strobiformis* | NA | | na | | | | | | |
| *Polypodium hesperium* | G5 | S1S2 | 2 | 8 | 25 | | | | x |
| *Pseudotsuga menziesii* | NA | | na | | | | | | |
| *Salix arizonica* | G2G3 | S1 | 0 | 1 | 0 | | | | |
| *Salix candida* | G5 | S2 | 1 | 20 | 5 | | x | | |
| *Salix serissima* | G4 | S1 | 0 | 7 | 0 | | | | |
| *Sclerocactus mesae-verdae* | G2 | S2 | 0 | 21 | 0 | | | | |
| *Sphagnum angustifolium* | G5 | S2 | 1 | ? | ? | | x | | |
| *Sphagnum balticum* | G3 | S1 | new | ? | ? | | | | |
| *Sphagnum girgensohnii* | G5 | S1 | 1 | 1 | 100 | | | | x |
| *Sporobolus nealleyi* | G5 | S1 | 1 | 1 | 100 | | | x | |
| *Stellaria irrigua* | G4? | S2 | 17 | 38 | 52 | | | | x |

| Global name | Global rank | State rank | Number EORs on SJPL | Number EORs in Colorado | % CO EORs on SJPL | BLM sensitive | FS sensitive | BLM highlight | FS Highlight |
|---|---|---|---|---|---|---|---|---|---|
| *Townsendia glabella* | G2 | S2 | 7 | 21 | 33 | | | x | x |
| *Townsendia rothrockii* | G2G3 | S2S3 | 9 | 28 | 32 | | | x | x |
| *Trifolium kingii* | G5 | S1 | 8 | 16 | 50 | | | | x |
| *Triteleia grandiflora* | G4G5 | S1 | 1 | 1 | 100 | | x | | |
| *Utricularia minor* | G5 | S2 | 2 | 8 | 25 | | x | | |
| *Viola pedatifida* | G5 | S2 | 3 | 37 | 8 | | | | x |
| *Woodsia neomexicana* | G4? | S2 | 6 | 30 | 20 | | | | x |

**Table 5. Monitoring status of all San Juan Public Lands Special Status Species**

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Acarospora nodulosa* var. *nodulosa* | k | 2 | G5T4? | S1 | E | 2005-05-15 | 13091 | |
| *Acarospora nodulosa* var. *nodulosa* | k | 4 | G5T4? | S1 | E | 2005-05-23 | 13093 | |
| *Acarospora nodulosa* var. *nodulosa* | k | 3 | G5T4? | S1 | E | 2005-05-15 | 13092 | |
| *Aliciella sedifolia* | L | no sjpl eor | G1 | S1 | | | | |
| *Aralia racemosa* | k | 4 | G4G5 | S1 | E | 1994-09-14 | 11756 | |
| *Aralia racemosa* | k | 3 | G4G5 | S1 | A | 2003-08-03 | 11743 | |
| *Aralia racemosa* | k | 2 | G4G5 | S1 | A | 2003-07-18 | 11717 | |
| *Aralia racemosa* | k | 1 | G4G5 | S1 | B | 1990-09-21 | 5000 | |
| *Artemisia pygmaea* | k | 3 | G4 | S1 | E | 1994-07-15 | 11301 | |
| *Artemisia pygmaea* | k | 4 | G4 | S1 | B | 2005-06-23 | 13115 | |
| *Asplenium trichomanes-ramosum* | k | 2 | G4 | S1S2 | H | 1934-07-08 | 9542 | |
| *Asplenium trichomanes-ramosum* | k | 10 | G4 | S1S2 | | 1995-08-26 | 71820 | |
| *Astragalus deterior* | k | 15 | G1G2 | S1S2 | H | 1948-06-13 | 2544 | |
| *Astragalus humillimus* | L | no sjpl eor | G1 | S1 | | | | |
| *Astragalus iodopetalus* | k | 1 | G2 | S1 | E | 1993-06-01 | 7891 | |
| *Astragalus missouriensis* var. *humistratus* | k | 8 | G5T1 | S1 | H | 1987-05-26 | 14147 | |
| *Astragalus missouriensis* var. *humistratus* | k | 4 | G5T1 | S1 | B | 2001-06-23 | 847 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Astragalus missouriensis* var. *humistratus* | k | 10 | G5T1 | S1 | E | 1992-06-04 | 14149 | |
| *Astragalus missouriensis* var. *humistratus* | k | 6 | G5T1 | S1 | E | 1998-05-26 | 14145 | |
| *Astragalus missouriensis* var. *humistratus* | k | 11 | G5T1 | S1 | E | 1998-05-26 | 14150 | |
| *Astragalus missouriensis* var. *humistratus* | k | 2 | G5T1 | S1 | B | 2001-06-22 | 7470 | transects estabb 2007, read 2009, Eight Mile Mesa Road |
| *Astragalus missouriensis* var. *humistratus* | k | 9 | G5T1 | S1 | E | 1998-06-08 | 14148 | |
| *Astragalus naturitensis* | k | 50 | G2G3 | S2S3 | B | 2007-04-28 | 14170 | |
| *Astragalus naturitensis* | k | 31 | G2G3 | S2S3 | C | 2005-05-10 | 6599 | |
| *Astragalus naturitensis* | k | 14 | G2G3 | S2S3 | H | 1986-03-14 | 7661 | |
| *Astragalus naturitensis* | k | 15 | G2G3 | S2S3 | A | 2005-05-07 | 3481 | |
| *Astragalus naturitensis* | k | 33 | G2G3 | S2S3 | C | 1999-05-30 | 8646 | |
| *Astragalus naturitensis* | k | 5 | G2G3 | S2S3 | C | 1999-05-26 | 11038 | |
| *Astragalus naturitensis* | k | 2 | G2G3 | S2S3 | H | 1978-05-99 | 7030 | |
| *Astragalus naturitensis* | k | 1 | G2G3 | S2S3 | B | 2007-06-12 | 7737 | |
| *Astragalus naturitensis* | k | 8 | G2G3 | S2S3 | A | 2007-05-09 | 9805 | |
| *Astragalus naturitensis* | k | 6 | G2G3 | S2S3 | H | 1983-05-03 | 5680 | |
| *Astragalus naturitensis* | k | 9 | G2G3 | S2S3 | H | 1978-05-99 | 1790 | |
| *Astragalus proximus* | k | 11 | G4 | S2 | H | 1951-06-17 | 3725 | |
| *Astragalus proximus* | k | 4 | G4 | S2 | H | 1924-07-01 | 8941 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Astragalus proximus* | k | 7 | G4 | S2 | B | 2005-06-13 | 2268 | transect estab 2008, Spring Creek |
| *Astragalus proximus* | k | 15 | G4 | S2 | B | 2005-06-10 | 5111 | Transect estab 2008, Piedra CG Rd |
| *Astragalus proximus* | k | 3 | G4 | S2 | A | 2004-05-19 | 1596 | 2 plots estab 2008, Chimney Rock |
| *Astragalus proximus* | k | 2 | G4 | S2 | A | 1997-07-07 | 579 | |
| *Astragalus schmolliae* | L | no sjpl eor | G1 | S1 | | | | |
| *Bupleurum americanum* | k | 1 | G5 | S1 | H | 1978-07-20 | 6979 | |
| *Calochortus flexuosus* | k | 19 | G4 | S2 | C | 2005-06-23 | 13119 | |
| *Calochortus flexuosus* | k | 12 | G4 | S2 | A | 1999-05-26 | 1634 0 | |
| *Carex diandra* | L | no sjpl eor | G5 | S1 | | | | |
| *Carex oreocharis* | k | 3 | G3 | S1 | H | 1987-08-02 | 8560 | |
| *Carex retrorsa* | k | 2 | G5 | S1 | E | 2001-08-31 | 1550 | |
| *Carex retrorsa* | k | 3 | G5 | S1 | C | 2005-07-20 | 13029 | |
| *Carex retrorsa* | k | 5 | G5 | S1 | B | 2005-07-08 | 13031 | |
| *Carex retrorsa* | k | 1 | G5 | S1 | B | 2005-09-08 | 7657 | |
| *Carex retrorsa* | k | 4 | G5 | S1 | B | 2005-07-26 | 13030 | |
| *Carex viridula* | k | 10 | G5 | S1 | A | 2006-07-09 | 6634 | |
| *Carex viridula* | k | 11 | G5 | S1 | A | 2005-06-27 | 11585 | |
| *Carex viridula* | k | 12 | G5 | S1 | D | 2003-07-20 | 11731 | |
| *Castilleja lineata* | k | 2 | G4? | S1 | A | 2002-05-04 | 2801 | |
| *Comarum palustre* | k | 14 | G5 | S1S2 | B | 2005-07-13 | 13028 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Commelina dianthifolia* | k | 6 | G5 | S1? | B | 2003-08-27 | 11740 | |
| *Cryptantha gypsophila* | k | 7 | G1G2 | S1S2 | A | 2005-05-04 | 13095 | |
| *Cryptantha gypsophila* | k | 4 | G1G2 | S1S2 | A | 2005-05-10 | 13089 | |
| *Cryptantha gypsophila* | k | 2 | G1G2 | S1S2 | B | 2007-08-21 | 13087 | |
| *Cryptantha gypsophila* | k | 8 | G1G2 | S1S2 | B | 2005-05-07 | 13096 | |
| *Cryptantha gypsophila* | k | 14 | G1G2 | S1S2 | B | 2008-04-30 | 13896 | |
| *Cryptantha gypsophila* | k | 16 | G1G2 | S1S2 | B | 2007-04-27 | 13902 | |
| *Cryptantha gypsophila* | k | 13 | G1G2 | S1S2 | C | 2007-08-22 | 13895 | |
| *Cryptantha gypsophila* | k | 1 | G1G2 | S1S2 | E | 2004-06-10 | 13086 | |
| *Cryptantha gypsophila* | k | 17 | G1G2 | S1S2 | A | 2007-04-27 | 13908 | |
| *Cryptantha gypsophila* | k | 3 | G1G2 | S1S2 | C | 2005-05-07 | 13088 | |
| *Cryptantha gypsophila* | k | 5 | G1G2 | S1S2 | B | 2005-05-15 | 13090 | |
| *Cryptantha gypsophila* | k | 15 | G1G2 | S1S2 | B | 2007-04-27 | 13901 | |
| *Cryptantha gypsophila* | k | 6 | G1G2 | S1S2 | A | 2005-05-15 | 13094 | |
| *Cryptogramma stelleri* | k | 2 | G5 | S2 | B | 2001-09-06 | 10035 | |
| *Cryptogramma stelleri* | k | 1 | G5 | S2 | C | 2002-08-26 | 3834 | |
| *Cryptogramma stelleri* | k | 18 | G5 | S2 | B | 2002-07-19 | 8923 | |
| *Cryptogramma stelleri* | k | 19 | G5 | S2 | B | 2002-07-23 | 6800 | |
| *Cryptogramma stelleri* | k | 17 | G5 | S2 | B | 2001-07-27 | 294 | |
| *Cypripedium parviflorum* | k | 15 | G5 | S2 | F | 1993-06-04 | 3528 | |
| *Cypripedium parviflorum* | k | 31 | G5 | S2 | C | 2003-06-19 | 11791 | |
| *Cypripedium parviflorum* | k | 4 | G5 | S2 | C | 2005-06-21 | 8496 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Cystopteris montana* | k | 1 | G5 | S1 | A | 2002-08-26 | 10575 | |
| *Cystopteris montana* | k | 3 | G5 | S1 | H | 1961-07-16 | 4311 | |
| *Descurainia kenheilii* | k | | | | | | | |
| *Draba borealis* | k | 8 | G4 | S2 | B | 2004-07-21 | 12301 | |
| *Draba borealis* | k | 9 | G4 | S2 | B | 2004-07-28 | 12304 | |
| *Draba borealis* | k | 12 | G4 | S2 | C | 2005-07-15 | 13120 | |
| *Draba borealis* | k | 10 | G4 | S2 | C | 2004-07-16 | 12309 | |
| *Draba borealis* | k | 11 | G4 | S2 | C | 2004-07-20 | 12316 | |
| *Draba graminea* | k | 32 | G2 | S2 | A | 2005-07-16 | 13123 | |
| *Draba graminea* | k | 11 | G2 | S2 | H | 1961-08-04 | 4829 | |
| *Draba graminea* | k | 16 | G2 | S2 | A | 2005-07-10 | 4590 | |
| *Draba graminea* | k | 20 | G2 | S2 | E | 1990-07-24 | 10223 | |
| *Draba graminea* | k | 24 | G2 | S2 | C | 2002-07-02 | 3469 | |
| *Draba graminea* | k | 15 | G2 | S2 | H | 1934-07-09 | 10392 | |
| *Draba graminea* | k | 25 | G2 | S2 | A | 2002-08-13 | 9176 | |
| *Draba graminea* | k | 19 | G2 | S2 | C | 1996-07-07 | 10222 | |
| *Draba graminea* | k | 31 | G2 | S2 | A | 2005-07-26 | 13100 | |
| *Draba graminea* | k | 17 | G2 | S2 | A | 2002-07-10 | 11362 | |
| *Draba graminea* | k | 29 | G2 | S2 | B | 2004-07-22 | 12322 | |
| *Draba graminea* | k | 3 | G2 | S2 | H | 1978-99-99 | 1905 | |
| *Draba graminea* | k | 13 | G2 | S2 | H | 1962-07-30 | 1617 | |
| *Draba graminea* | k | 27 | G2 | S2 | B | 2003-08-25 | 11733 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Draba graminea* | k | 26 | G2 | S2 | C | 2002-07-29 | 3684 | |
| *Draba graminea* | k | 30 | G2 | S2 | B | 2005-07-15 | 13099 | |
| *Draba malpighiacea* | k | | | | | | | |
| *Draba porsildii* | k | 9 | G3G4 | S1 | H | 1982-07-11 | 1807 | |
| *Draba smithii* | k | 18 | G2 | S2 | B | 2001-09-06 | 3177 | Monitoring estab 2007, read 2009, E. Fk. San Juan R |
| *Drosera anglica* | k | 1 | G5 | S1 | B | 2006-08-25 | 13494 | |
| *Epipactis gigantea* | k | 43 | G4 | S2 | B | 2004-06-09 | 9644 | Monitoring estab 2007, Dolores River below McPhee |
| *Epipactis gigantea* | k | 9 | G4 | S2 | A | 2006-07-15 | 6968 | Monitoring estab 2007, re-visited 2009, not quantitative |
| *Epipactis gigantea* | k | 31 | G4 | S2 | B | 1999-05-31 | 4037 | |
| *Equisetum variegatum* | k | 4 | G5 | S1 | C | 2001-09-07 | 2802 | |
| *Equisetum variegatum* | k | 7 | G5 | S1 | A | 2003-08-03 | 11755 | |
| *Equisetum variegatum* | k | 5 | G5 | S1 | C | 2005-07-14 | 6041 | |
| *Erigeron kachinensis* | k | 2 | G2 | S1 | A | 1999-05-25 | 4101 | |
| *Erigeron philadelphicus* | k | 4 | G5 | S1 | C | 2001-07-11 | 504 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 12 | G4?T3 T4 | S3 | A | 2002-07-23 | 887 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 3 | G4?T3 T4 | S3 | A | 2002-07-11 | 6316 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Eriophorum altaicum* var. *neogaeum* | k | 15 | G4?T3 T4 | S3 | B | 2005-07-22 | 8500 | Monitoring estab 2007, Clear Lake |
| *Eriophorum altaicum* var. *neogaeum* | k | 22 | G4?T3 T4 | S3 | A | 2003-08-06 | 568 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 23 | G4?T3 T4 | S3 | B | 1995-08-16 | 10409 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 26 | G4?T3 T4 | S3 | C | 1996-08-02 | 3191 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 17 | G4?T3 T4 | S3 | B | 1994-08-26 | 9086 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 19 | G4?T3 T4 | S3 | B | 1994-08-23 | 8430 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 24 | G4?T3 T4 | S3 | D | 1995-08-30 | 4207 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 46 | G4?T3 T4 | S3 | B | 2004-07-22 | 12323 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 1 | G4?T3 T4 | S3 | H | 1962-08-99 | 10281 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 13 | G4?T3 T4 | S3 | A | 2002-07-26 | 5644 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 42 | G4?T3 T4 | S3 | B | 2002-08-07 | 10525 | Monitoring estab 2008, South Park |
| *Eriophorum altaicum* var. *neogaeum* | k | 37 | G4?T3 T4 | S3 | B | 2002-07-27 | 1199 | |
| *Eriophorum altaicum* var. | k | 36 | G4?T3 | S3 | B | 2006-08-31 | 9642 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *neogaeum* | | | T4 | | | | | |
| *Eriophorum altaicum* var. *neogaeum* | k | 41 | G4?T3 T4 | S3 | A | 2002-07-29 | 318 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 40 | G4?T3 T4 | S3 | B | 2005-07-15 | 7405 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 18 | G4?T3 T4 | S3 | A | 2005-08-26 | 5351 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 14 | G4?T3 T4 | S3 | C | 2005-07-25 | 3947 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 39 | G4?T3 T4 | S3 | E | 1995-09-10 | 7406 | |
| *Eriophorum altaicum* var. *neogaeum* | k | 7 | G4?T3 T4 | S3 | H | 1961-08-26 | 3004 | |
| *Eriophorum chamissonis* | k | 5 | G5 | S1 | | 1994-07-27 | 9742 | Monitoring estab 2008, Grizzly Pk |
| *Eriophorum chamissonis* | k | 2 | G5 | S1 | A | 2005-08-20 | 5807 | |
| *Eriophorum gracile* | L | no sjpl eor | G5 | S2 | | | | |
| *Festuca arizonica - Muhlenbergia montana Herbaceous Vegetation* | k | 11 | G3 | S2 | E | 1988-08-22 | 5552 | |
| *Gilia haydenii* | k | 3 | G3 | S2 | A | 2004-06-02 | 12255 | |
| *Gilia haydenii* | k | 5 | G3 | S2 | A | 2004-06-25 | 12257 | |
| *Gilia haydenii* | k | 2 | G3 | S2 | E | 1993-06-11 | 11757 | |
| *Gutierrezia elegans* | k | | | | | | | |
| *Gypsoplaca macrophylla* | k | 2 | G3G4 | S1 | E | 2005-05-15 | 13122 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Gypsoplaca macrophylla* | k | 1 | G3G4 | S1 | E | 2005-05-23 | 13121 | |
| *Hackelia gracilenta* | k | 15 | G1 | S1 | B | 1997-99-99 | 13169 | |
| *Hamatocaulis vernicosus* | k | | | | | | | |
| *Iliamna grandiflora* | k | 5 | G3?Q | S1 | H | 1954-06-15 | 5918 | |
| *Iliamna grandiflora* | k | 6 | G3?Q | S1 | C | 1994-07-30 | 5035 | |
| *Ipomopsis polyantha* | L | no sjpl eor | G1 | S1 | | | | Monitored on Archuleta County property |
| *Lecanora gypsicola* | k | 4 | G1 | S1 | E | 2005-05-15 | 13195 | |
| *Lecanora gypsicola* | k | 2 | G1 | S1 | E | 2005-05-15 | 13193 | |
| *Lecanora gypsicola* | k | 3 | G1 | S1 | E | 2005-05-23 | 13194 | |
| *Lesquerella pruinosa* | k | 10 | G2 | S2 | A | 2004-05-17 | 3878 | Monitoring established ??, last read 2007, O'Neal Hill |
| *Lesquerella pruinosa* | k | 21 | G2 | S2 | B | 2004-05-10 | 12671 | Monitoring established 2007, Williams Creek |
| *Lesquerella pruinosa* | k | 20 | G2 | S2 | AB | 2003-05-22 | 12670 | Monitoring established 2007, Forest Road 629 |
| *Lesquerella pruinosa* | k | 2 | G2 | S2 | B | 2004-05-20 | 3305 | Monitoring established 2007, Eight Mile Mesa Road, re-estab 2009 |
| *Lesquerella pruinosa* | k | 16 | G2 | S2 | AB | 2003-07-17 | 7429 | Monitoring established 2007, Nichols Draw |
| *Machaeranthera coloradoensis* | k | 32 | G2 | S2 | A | 2007-08-30 | 12273 | Monitoring established 2007, Highline Trail |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Machaeranthera coloradoensis* | k | 26 | G2 | S2 | B | 2005-08-24 | 5521 | Monitoring established 2007, Summit Pass |
| *Machaeranthera coloradoensis* | k | 1 | G2 | S2 | H | 1934-07-06 | 5506 | |
| *Machaeranthera coloradoensis* | k | 31 | G2 | S2 | A | 2005-07-21 | 12272 | |
| *Machaeranthera coloradoensis* | k | 7 | G2 | S2 | H | 1972-07-18 | 8145 | |
| *Machaeranthera coloradoensis* | k | 8 | G2 | S2 | A | 2003-08-21 | 3394 | Monitoring established 2007, Lime Mesa |
| *Machaeranthera coloradoensis* | k | 6 | G2 | S2 | B | 2002-07-14 | 6066 | Monitoring established 2007, Grand Turk |
| *Machaeranthera coloradoensis* | k | 25 | G2 | S2 | D | 2002-08-08 | 1953 | |
| *Machaeranthera coloradoensis* | k | 33 | G2 | S2 | B | 2005-07-15 | 13105 | Monitoring established 2008, Colorado Trail |
| *Machaeranthera coloradoensis* | k | 34 | G2 | S2 | A | 2006-07-26 | 13286 | |
| *Mimulus eastwoodiae* | k | 6 | G3G4 | S1 | B | 1999-05-29 | 4295 | |
| *Mimulus eastwoodiae* | k | 12 | G3G4 | S1 | D | 1999-05-31 | 2071 | |
| *Parnassia kotzebuei* | L | no sjpl eor | G5 | S2 | | | | |
| *Pediocactus knowltonii* | L | no sjpl eor | G1 | S1 | | | | |
| *Pediomelum aromaticum* | k | 1 | G3 | S2 | H | 1982-06-18 | 5339 | |
| *Penstemon breviculus* | k | 16 | G3 | S2 | D | 1999-07-13 | 7746 | |
| *Penstemon breviculus* | k | 14 | G3 | S2 | C | 1999-07-10 | 72480 | |
| *Penstemon breviculus* | k | 26 | G3 | S2 | B | 2004-06-03 | 12277 | |
| *Penstemon breviculus* | k | 12 | G3 | S2 | H | 1962-06-03 | 12 | |
| *Penstemon breviculus* | k | 25 | G3 | S2 | A | 2004-06-03 | 12276 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Penstemon breviculus* | k | 17 | G3 | S2 | C | 2005-05-10 | 6081 | |
| *Penstemon breviculus* | k | 8 | G3 | S2 | H | 1982-05-31 | 7743 | |
| *Penstemon breviculus* | k | 24 | G3 | S2 | B | 2004-06-02 | 12274 | |
| *Physaria cnema* | L | no sjpl eor | GNR | SNR | | | | |
| *Physaria pulvinata* | k | 1 | G1 | S1 | B | 2007-05-08 | 13097 | |
| *Physaria pulvinata* | k | 1 | G1 | S1 | B | 2007-05-08 | 13097 | Transects established 2007, Plateau Creek. Full census 2009 |
| *Physaria scrotiformis* | k | | | | | | | |
| *Pinus ponderosa* | k | | | | | | | |
| *Pinus strobiformis* | k | | | | | | | |
| *Polypodium hesperium* | k | 2 | G5 | S1S2 | D | 2003-08-26 | 4935 | |
| *Polypodium hesperium* | k | 8 | G5 | S1S2 | C | 2001-07-13 | 9046 | |
| *Pseudotsuga menziesii* | k | | | | | | | |
| *Salix arizonica* | L | no sjpl eor | G2G3 | S1 | | | | |
| *Salix candida* | k | 1 | G5 | S2 | H | 1985-08-04 | 4895 | |
| *Salix serissima* | L | no sjpl eor | G4 | S1 | | | | |
| *Sclerocactus mesae-verdae* | L | no sjpl eor | G2 | S2 | | | | |
| *Sphagnum angustifolium* | k | 1 | G5 | S2 | E | 2001-07-99 | 9783 | |
| *Sphagnum balticum* | k | | | | | | | |
| *Sphagnum girgensohnii* | k | 1 | G5 | S1 | E | 2001-07-99 | 3071 | |
| *Sporobolus nealleyi* | k | 1 | G5 | S1 | B | 2005-05-09 | 13139 | |
| *Stellaria irrigua* | k | 18 | G4? | S2 | H | 1970-07-21 | 2000 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Stellaria irrigua* | k | 33 | G4? | S2 | H | 1962-08-19 | 11793 00000 | |
| *Stellaria irrigua* | k | 17 | G4? | S2 | H | 1899-08-99 | 8390 | |
| *Stellaria irrigua* | k | 41 | G4? | S2 | B | 2004-07-16 | 12310 | |
| *Stellaria irrigua* | k | 6 | G4? | S2 | E | 9999-99-99 | 10152 | |
| *Stellaria irrigua* | k | 25 | G4? | S2 | | 1999-07-31 | 8054 | |
| *Stellaria irrigua* | k | 22 | G4? | S2 | B | 1999-07-27 | 10692 | |
| *Stellaria irrigua* | k | 28 | G4? | S2 | B | 2003-08-24 | 11729 | |
| *Stellaria irrigua* | k | 12 | G4? | S2 | H | 1962-08-10 | 7403 | |
| *Stellaria irrigua* | k | 31 | G4? | S2 | B | 2003-08-04 | 11738 | |
| *Stellaria irrigua* | k | 2 | G4? | S2 | | 1988-07-19 | 4885 | |
| *Stellaria irrigua* | k | 38 | G4? | S2 | C | 2004-07-21 | 12302 | |
| *Stellaria irrigua* | k | 15 | G4? | S2 | B | 2003-08-25 | 2135 | |
| *Stellaria irrigua* | k | 39 | G4? | S2 | B | 2004-07-28 | 12305 | |
| *Stellaria irrigua* | k | 19 | G4? | S2 | A | 1999-07-31 | 8330 | |
| *Stellaria irrigua* | k | 40 | G4? | S2 | C | 2004-07-28 | 12307 | |
| *Stellaria irrigua* | k | 42 | G4? | S2 | B | 2004-07-22 | 12313 | |
| *Townsendia glabella* | k | 8 | G2 | S2 | D | 2005-06-18 | 8609 | |
| *Townsendia glabella* | k | 3 | G2 | S2 | H | 1930-05-12 | 8858 | |
| *Townsendia glabella* | k | 14 | G2 | S2 | H | 1954-07-03 | 12589 | |
| *Townsendia glabella* | k | 5 | G2 | S2 | H | 1924-07-01 | 920 | |
| *Townsendia glabella* | k | 6 | G2 | S2 | A | 2002-05-05 | 191 | |
| *Townsendia glabella* | k | 20 | G2 | S2 | B | 2005-06-18 | 13103 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Townsendia glabella* | k | 11 | G2 | S2 | H | 1951-06-16 | 12586 | |
| *Townsendia rothrockii* | k | 26 | G2G3 | S2S3 | E | 2002-06-11 | 14126 | |
| *Townsendia rothrockii* | k | 6 | G2G3 | S2S3 | C | 2002-07-25 | 877 | |
| *Townsendia rothrockii* | k | 8 | G2G3 | S2S3 | A | 2003-08-22 | 11726 | |
| *Townsendia rothrockii* | k | 5 | G2G3 | S2S3 | E | 1996-05-07 | 4078 | |
| *Townsendia rothrockii* | k | 4 | G2G3 | S2S3 | H | 1951-05-16 | 9356 | |
| *Townsendia rothrockii* | k | 10 | G2G3 | S2S3 | E | 1993-07-12 | 11792 | |
| *Townsendia rothrockii* | k | 27 | G2G3 | S2S3 | E | 1993-09-02 | 14128 | |
| *Townsendia rothrockii* | k | 9 | G2G3 | S2S3 | A | 2003-08-06 | 11739 | |
| *Townsendia rothrockii* | k | 12 | G2G3 | S2S3 | A | 2005-09-99 | 13104 | |
| *Trifolium kingii* | k | 12 | G5 | S1 | | 1991-08-04 | 12260 | |
| *Trifolium kingii* | k | 15 | G5 | S1 | A | 2004-06-11 | 12263 | |
| *Trifolium kingii* | k | 17 | G5 | S1 | A | 2004-07-17 | 12265 | |
| *Trifolium kingii* | k | 13 | G5 | S1 | B | 2004-07-17 | 12261 | |
| *Trifolium kingii* | k | 18 | G5 | S1 | B | 2005-07-06 | 13110 | |
| *Trifolium kingii* | k | 14 | G5 | S1 | B | 2004-07-21 | 12262 | |
| *Trifolium kingii* | k | 16 | G5 | S1 | B | 2004-06-11 | 12264 | |
| *Trifolium kingii* | k | 11 | G5 | S1 | A | 2004-07-17 | 12259 | |
| *Triteleia grandiflora* | k | 1 | G4G5 | S1 | A | 2004-06-04 | 5817 | Transect established 2008 |
| *Utricularia minor* | k | 5 | G5 | S2 | E | 2000-09-01 | 13483 | |
| *Utricularia minor* | k | 1 | G5 | S2 | E | 1999-07-25 | 12346 | |
| *Viola pedatifida* | k | 24 | G5 | S2 | C | 2001-06-11 | 1985 | |

| Global Name | Known or likely | Element Occurrence number | Global rank | State rank | Element occurrence rank | Last observation | EOid | Monitoring status |
|---|---|---|---|---|---|---|---|---|
| *Viola pedatifida* | k | 35 | G5 | S2 | B | 2002-05-07 | 11370 | |
| *Viola pedatifida* | k | 34 | G5 | S2 | C | 2002-05-28 | 1753 | |
| *Woodsia neomexicana* | k | 14 | G4? | S2 | E | 2006-99-99 | 5231 | |
| *Woodsia neomexicana* | k | 30 | G4? | S2 | B | 2003-09-15 | 117420 | |
| *Woodsia neomexicana* | k | 27 | G4? | S2 | C | 2001-08-11 | 740 | |
| *Woodsia neomexicana* | k | 31 | G4? | S2 | C | 2003-08-03 | 11754 | |
| *Woodsia neomexicana* | k | 29 | G4? | S2 | D | 2003-07-20 | 11730 | |
| *Woodsia neomexicana* | k | 32 | G4? | S2 | B | 2005-09-18 | 13109 | |

**Table 6. San Juan Public Lands Element Occurrences with last observation date greater than 10 years ago and BLM or FS sensitive. (See also GIS shape files provided). These occurrences would be top priority for updating.**

| Global name | Element occurrence number | Last observation |
|---|---|---|
| *Astragalus missouriensis* var. *humistratus* | 10 | 1992-06-04 |
| *Astragalus missouriensis* var. *humistratus* | 6 | 1998-05-26 |
| *Astragalus missouriensis* var. *humistratus* | 8 | 1987-05-26 |
| *Astragalus missouriensis* var. *humistratus* | 11 | 1998-05-26 |
| *Astragalus missouriensis* var. *humistratus* | 9 | 1998-06-08 |
| *Astragalus naturitensis* | 2 | 1978-05-99 |
| *Astragalus naturitensis* | 6 | 1983-05-03 |
| *Astragalus naturitensis* | 5 | 1999-05-26 |
| *Astragalus naturitensis* | 9 | 1978-05-99 |
| *Astragalus naturitensis* | 33 | 1999-05-30 |
| *Astragalus naturitensis* | 14 | 1986-03-14 |
| *Astragalus proximus* | 2 | 1997-07-07 |
| *Astragalus proximus* | 4 | 1924-07-01 |
| *Astragalus proximus* | 11 | 1951-06-17 |
| *Calochortus flexuosus* | 12 | 1999-05-26 |
| *Cypripedium parviflorum* | 15 | 1993-06-04 |
| *Epipactis gigantea* | 31 | 1999-05-31 |
| *Erigeron kachinensis* | 2 | 1999-05-25 |
| *Eriophorum altaicum* var. *neogaeum* | 39 | 1995-09-10 |
| *Eriophorum altaicum* var. *neogaeum* | 23 | 1995-08-16 |
| *Eriophorum altaicum* var. *neogaeum* | 1 | 1962-08-99 |
| *Eriophorum altaicum* var. *neogaeum* | 24 | 1995-08-30 |
| *Eriophorum altaicum* var. *neogaeum* | 19 | 1994-08-23 |
| *Eriophorum altaicum* var. *neogaeum* | 17 | 1994-08-26 |
| *Eriophorum altaicum* var. *neogaeum* | 7 | 1961-08-26 |
| *Eriophorum altaicum* var. *neogaeum* | 26 | 1996-08-02 |
| *Eriophorum chamissonis* | 5 | 1994-07-27 |
| *Gilia haydenii* | 2 | 1993-06-11 |

| Global name | Element occurrence number | Last observation |
|---|---|---|
| *Machaeranthera coloradoensis* | 1 | 1934-07-06 |
| *Machaeranthera coloradoensis* | 7 | 1972-07-18 |
| *Mimulus eastwoodiae* | 6 | 1999-05-29 |
| *Mimulus eastwoodiae* | 12 | 1999-05-31 |
| *Pediomelum aromaticum* | 1 | 1982-06-18 |
| *Salix candida* | 1 | 1985-08-04 |
| *Utricularia minor* | 1 | 1999-07-25 |

**Table 7. San Juan Public Lands Element Occurrences with last observation date Greater than 10 years (sensitive or not)**

| Global name | Element occurrence number | Last observation |
|---|---|---|
| *Aralia racemosa* | 1 | 1990-09-21 |
| *Aralia racemosa* | 4 | 1994-09-14 |
| *Artemisia pygmaea* | 3 | 1994-07-15 |
| *Asplenium trichomanes-ramosum* | 2 | 1934-07-08 |
| *Asplenium trichomanes-ramosum* | 10 | 1995-08-26 |
| *Astragalus deterior* | 15 | 1948-06-13 |
| *Astragalus iodopetalus* | 1 | 1993-06-01 |
| *Astragalus missouriensis* var. *humistratus* | 10 | 1992-06-04 |
| *Astragalus missouriensis* var. *humistratus* | 11 | 1998-05-26 |
| *Astragalus missouriensis* var. *humistratus* | 9 | 1998-06-08 |
| *Astragalus missouriensis* var. *humistratus* | 6 | 1998-05-26 |
| *Astragalus missouriensis* var. *humistratus* | 8 | 1987-05-26 |
| *Astragalus naturitensis* | 2 | 1978-05-99 |
| *Astragalus naturitensis* | 9 | 1978-05-99 |
| *Astragalus naturitensis* | 6 | 1983-05-03 |
| *Astragalus naturitensis* | 33 | 1999-05-30 |
| *Astragalus naturitensis* | 14 | 1986-03-14 |
| *Astragalus naturitensis* | 5 | 1999-05-26 |
| *Astragalus proximus* | 4 | 1924-07-01 |
| *Astragalus proximus* | 11 | 1951-06-17 |
| *Astragalus proximus* | 2 | 1997-07-07 |
| *Bupleurum americanum* | 1 | 1978-07-20 |

| Global name | Element occurrence number | Last observation |
|---|---|---|
| *Calochortus flexuosus* | 12 | 1999-05-26 |
| *Carex oreocharis* | 3 | 1987-08-02 |
| *Cypripedium parviflorum* | 15 | 1993-06-04 |
| *Cystopteris montana* | 3 | 1961-07-16 |
| *Draba graminea* | 13 | 1962-07-30 |
| *Draba graminea* | 15 | 1934-07-09 |
| *Draba graminea* | 3 | 1978-99-99 |
| *Draba graminea* | 20 | 1990-07-24 |
| *Draba graminea* | 11 | 1961-08-04 |
| *Draba graminea* | 19 | 1996-07-07 |
| *Draba porsildii* | 9 | 1982-07-11 |
| *Epipactis gigantea* | 31 | 1999-05-31 |
| *Erigeron kachinensis* | 2 | 1999-05-25 |
| *Eriophorum altaicum* var. *neogaeum* | 7 | 1961-08-26 |
| *Eriophorum altaicum* var. *neogaeum* | 19 | 1994-08-23 |
| *Eriophorum altaicum* var. *neogaeum* | 17 | 1994-08-26 |
| *Eriophorum altaicum* var. *neogaeum* | 24 | 1995-08-30 |
| *Eriophorum altaicum* var. *neogaeum* | 23 | 1995-08-16 |
| *Eriophorum altaicum* var. *neogaeum* | 26 | 1996-08-02 |
| *Eriophorum altaicum* var. *neogaeum* | 1 | 1962-08-99 |
| *Eriophorum altaicum* var. *neogaeum* | 39 | 1995-09-10 |
| *Eriophorum chamissonis* | 5 | 1994-07-27 |
| *Festuca arizonica - Muhlenbergia montana Herbaceous Vegetation* | 11 | 1988-08-22 |
| *Gilia haydenii* | 2 | 1993-06-11 |
| *Hackelia gracilenta* | 15 | 1997-99-99 |
| *Iliamna grandiflora* | 6 | 1994-07-30 |
| *Iliamna grandiflora* | 5 | 1954-06-15 |
| *Machaeranthera coloradoensis* | 7 | 1972-07-18 |
| *Machaeranthera coloradoensis* | 1 | 1934-07-06 |
| *Mimulus eastwoodiae* | 6 | 1999-05-29 |
| *Mimulus eastwoodiae* | 12 | 1999-05-31 |
| *Pediomelum aromaticum* | 1 | 1982-06-18 |
| *Penstemon breviculus* | 14 | 1999-07-10 |
| *Penstemon breviculus* | 16 | 1999-07-13 |
| *Penstemon breviculus* | 12 | 1962-06-03 |

| Global name | Element occurrence number | Last observation |
|---|---|---|
| *Penstemon breviculus* | 8 | 1982-05-31 |
| *Salix candida* | 1 | 1985-08-04 |
| *Stellaria irrigua* | 17 | 1899-08-99 |
| *Stellaria irrigua* | 2 | 1988-07-19 |
| *Stellaria irrigua* | 25 | 1999-07-31 |
| *Stellaria irrigua* | 12 | 1962-08-10 |
| *Stellaria irrigua* | 22 | 1999-07-27 |
| *Stellaria irrigua* | 19 | 1999-07-31 |
| *Stellaria irrigua* | 33 | 1962-08-19 |
| *Stellaria irrigua* | 18 | 1970-07-21 |
| *Townsendia glabella* | 11 | 1951-06-16 |
| *Townsendia glabella* | 5 | 1924-07-01 |
| *Townsendia glabella* | 14 | 1954-07-03 |
| *Townsendia glabella* | 3 | 1930-05-12 |
| *Townsendia rothrockii* | 27 | 1993-09-02 |
| *Townsendia rothrockii* | 5 | 1996-05-07 |
| *Townsendia rothrockii* | 4 | 1951-05-16 |
| *Townsendia rothrockii* | 10 | 1993-07-12 |
| *Trifolium kingii* | 12 | 1991-08-04 |
| *Utricularia minor* | 1 | 1999-07-25 |

**Table 8. All San Juan Public Lands Element Occurrences with last observation date greater than 5 years ago.**

| Global name | Element occurrence number | Last observation date |
|---|---|---|
| *Aralia racemosa* | 2 | 2003-07-18 |
| *Aralia racemosa* | 3 | 2003-08-03 |
| *Aralia racemosa* | 1 | 1990-09-21 |
| *Aralia racemosa* | 4 | 1994-09-14 |
| *Artemisia pygmaea* | 3 | 1994-07-15 |
| *Asplenium trichomanes-ramosum* | 2 | 1934-07-08 |
| *Asplenium trichomanes-ramosum* | 10 | 1995-08-26 |
| *Astragalus deterior* | 15 | 1948-06-13 |

| Global name | Element occurrence number | Last observation date |
|---|---|---|
| *Astragalus iodopetalus* | 1 | 1993-06-01 |
| *Astragalus missouriensis* var. *humistratus* | 2 | 2001-06-22 |
| *Astragalus missouriensis* var. *humistratus* | 4 | 2001-06-23 |
| *Astragalus missouriensis* var. *humistratus* | 6 | 1998-05-26 |
| *Astragalus missouriensis* var. *humistratus* | 9 | 1998-06-08 |
| *Astragalus missouriensis* var. *humistratus* | 11 | 1998-05-26 |
| *Astragalus missouriensis* var. *humistratus* | 10 | 1992-06-04 |
| *Astragalus missouriensis* var. *humistratus* | 8 | 1987-05-26 |
| *Astragalus naturitensis* | 6 | 1983-05-03 |
| *Astragalus naturitensis* | 33 | 1999-05-30 |
| *Astragalus naturitensis* | 5 | 1999-05-26 |
| *Astragalus naturitensis* | 9 | 1978-05-99 |
| *Astragalus naturitensis* | 14 | 1986-03-14 |
| *Astragalus naturitensis* | 2 | 1978-05-99 |
| *Astragalus proximus* | 3 | 2004-05-19 |
| *Astragalus proximus* | 11 | 1951-06-17 |
| *Astragalus proximus* | 4 | 1924-07-01 |
| *Astragalus proximus* | 2 | 1997-07-07 |
| *Bupleurum americanum* | 1 | 1978-07-20 |
| *Calochortus flexuosus* | 12 | 1999-05-26 |
| *Carex oreocharis* | 3 | 1987-08-02 |
| *Carex retrorsa* | 2 | 2001-08-31 |
| *Carex viridula* | 12 | 2003-07-20 |
| *Castilleja lineata* | 2 | 2002-05-04 |
| *Commelina dianthifolia* | 6 | 2003-08-27 |
| *Cryptantha gypsophila* | 1 | 2004-06-10 |
| *Cryptogramma stelleri* | 19 | 2002-07-23 |
| *Cryptogramma stelleri* | 2 | 2001-09-06 |
| *Cryptogramma stelleri* | 1 | 2002-08-26 |
| *Cryptogramma stelleri* | 18 | 2002-07-19 |
| *Cryptogramma stelleri* | 17 | 2001-07-27 |
| *Cypripedium parviflorum* | 31 | 2003-06-19 |
| *Cypripedium parviflorum* | 15 | 1993-06-04 |
| *Cystopteris montana* | 1 | 2002-08-26 |
| *Cystopteris montana* | 3 | 1961-07-16 |

| Global name | Element occurrence number | Last observation date |
|---|---|---|
| *Draba borealis* | 9 | 2004-07-28 |
| *Draba borealis* | 10 | 2004-07-16 |
| *Draba borealis* | 8 | 2004-07-21 |
| *Draba borealis* | 11 | 2004-07-20 |
| *Draba graminea* | 29 | 2004-07-22 |
| *Draba graminea* | 27 | 2003-08-25 |
| *Draba graminea* | 26 | 2002-07-29 |
| *Draba graminea* | 17 | 2002-07-10 |
| *Draba graminea* | 24 | 2002-07-02 |
| *Draba graminea* | 25 | 2002-08-13 |
| *Draba graminea* | 11 | 1961-08-04 |
| *Draba graminea* | 13 | 1962-07-30 |
| *Draba graminea* | 3 | 1978-99-99 |
| *Draba graminea* | 19 | 1996-07-07 |
| *Draba graminea* | 15 | 1934-07-09 |
| *Draba graminea* | 20 | 1990-07-24 |
| *Draba porsildii* | 9 | 1982-07-11 |
| *Draba smithii* | 18 | 2001-09-06 |
| *Epipactis gigantea* | 43 | 2004-06-09 |
| *Epipactis gigantea* | 31 | 1999-05-31 |
| *Equisetum variegatum* | 7 | 2003-08-03 |
| *Equisetum variegatum* | 4 | 2001-09-07 |
| *Erigeron kachinensis* | 2 | 1999-05-25 |
| *Erigeron philadelphicus* | 4 | 2001-07-11 |
| *Eriophorum altaicum* var. *neogaeum* | 12 | 2002-07-23 |
| *Eriophorum altaicum* var. *neogaeum* | 13 | 2002-07-26 |
| *Eriophorum altaicum* var. *neogaeum* | 37 | 2002-07-27 |
| *Eriophorum altaicum* var. *neogaeum* | 3 | 2002-07-11 |
| *Eriophorum altaicum* var. *neogaeum* | 42 | 2002-08-07 |
| *Eriophorum altaicum* var. *neogaeum* | 22 | 2003-08-06 |
| *Eriophorum altaicum* var. *neogaeum* | 41 | 2002-07-29 |
| *Eriophorum altaicum* var. *neogaeum* | 46 | 2004-07-22 |
| *Eriophorum altaicum* var. *neogaeum* | 23 | 1995-08-16 |
| *Eriophorum altaicum* var. *neogaeum* | 7 | 1961-08-26 |
| *Eriophorum altaicum* var. *neogaeum* | 26 | 1996-08-02 |

| Global name | Element occurrence number | Last observation date |
|---|---|---|
| *Eriophorum altaicum* var. *neogaeum* | 17 | 1994-08-26 |
| *Eriophorum altaicum* var. *neogaeum* | 19 | 1994-08-23 |
| *Eriophorum altaicum* var. *neogaeum* | 24 | 1995-08-30 |
| *Eriophorum altaicum* var. *neogaeum* | 1 | 1962-08-99 |
| *Eriophorum altaicum* var. *neogaeum* | 39 | 1995-09-10 |
| *Eriophorum chamissonis* | 5 | 1994-07-27 |
| *Festuca arizonica - Muhlenbergia montana* Herbaceous Vegetation | 11 | 1988-08-22 |
| *Gilia haydenii* | 5 | 2004-06-25 |
| *Gilia haydenii* | 3 | 2004-06-02 |
| *Gilia haydenii* | 2 | 1993-06-11 |
| *Hackelia gracilenta* | 15 | 1997-99-99 |
| *Iliamna grandiflora* | 5 | 1954-06-15 |
| *Iliamna grandiflora* | 6 | 1994-07-30 |
| *Lesquerella pruinosa* | 2 | 2004-05-20 |
| *Lesquerella pruinosa* | 16 | 2003-07-17 |
| *Lesquerella pruinosa* | 20 | 2003-05-22 |
| *Lesquerella pruinosa* | 21 | 2004-05-10 |
| *Lesquerella pruinosa* | 10 | 2004-05-17 |
| *Machaeranthera coloradoensis* | 8 | 2003-08-21 |
| *Machaeranthera coloradoensis* | 6 | 2002-07-14 |
| *Machaeranthera coloradoensis* | 25 | 2002-08-08 |
| *Machaeranthera coloradoensis* | 7 | 1972-07-18 |
| *Machaeranthera coloradoensis* | 1 | 1934-07-06 |
| *Mimulus eastwoodiae* | 6 | 1999-05-29 |
| *Mimulus eastwoodiae* | 12 | 1999-05-31 |
| *Pediomelum aromaticum* | 1 | 1982-06-18 |
| *Penstemon breviculus* | 24 | 2004-06-02 |
| *Penstemon breviculus* | 25 | 2004-06-03 |
| *Penstemon breviculus* | 26 | 2004-06-03 |
| *Penstemon breviculus* | 12 | 1962-06-03 |
| *Penstemon breviculus* | 8 | 1982-05-31 |
| *Penstemon breviculus* | 16 | 1999-07-13 |
| *Penstemon breviculus* | 14 | 1999-07-10 |
| *Polypodium hesperium* | 8 | 2001-07-13 |
| *Polypodium hesperium* | 2 | 2003-08-26 |

| Global name | Element occurrence number | Last observation date |
|---|---|---|
| *Salix candida* | 1 | 1985-08-04 |
| *Sphagnum angustifolium* | 1 | 2001-07-99 |
| *Sphagnum girgensohnii* | 1 | 2001-07-99 |
| *Stellaria irrigua* | 39 | 2004-07-28 |
| *Stellaria irrigua* | 15 | 2003-08-25 |
| *Stellaria irrigua* | 38 | 2004-07-21 |
| *Stellaria irrigua* | 40 | 2004-07-28 |
| *Stellaria irrigua* | 28 | 2003-08-24 |
| *Stellaria irrigua* | 42 | 2004-07-22 |
| *Stellaria irrigua* | 31 | 2003-08-04 |
| *Stellaria irrigua* | 41 | 2004-07-16 |
| *Stellaria irrigua* | 2 | 1988-07-19 |
| *Stellaria irrigua* | 18 | 1970-07-21 |
| *Stellaria irrigua* | 17 | 1899-08-99 |
| *Stellaria irrigua* | 33 | 1962-08-19 |
| *Stellaria irrigua* | 12 | 1962-08-10 |
| *Stellaria irrigua* | 25 | 1999-07-31 |
| *Stellaria irrigua* | 19 | 1999-07-31 |
| *Stellaria irrigua* | 22 | 1999-07-27 |
| *Townsendia glabella* | 6 | 2002-05-05 |
| *Townsendia glabella* | 14 | 1954-07-03 |
| *Townsendia glabella* | 11 | 1951-06-16 |
| *Townsendia glabella* | 3 | 1930-05-12 |
| *Townsendia glabella* | 5 | 1924-07-01 |
| *Townsendia rothrockii* | 26 | 2002-06-11 |
| *Townsendia rothrockii* | 8 | 2003-08-22 |
| *Townsendia rothrockii* | 6 | 2002-07-25 |
| *Townsendia rothrockii* | 9 | 2003-08-06 |
| *Townsendia rothrockii* | 10 | 1993-07-12 |
| *Townsendia rothrockii* | 27 | 1993-09-02 |
| *Townsendia rothrockii* | 4 | 1951-05-16 |
| *Townsendia rothrockii* | 5 | 1996-05-07 |
| *Trifolium kingii* | 17 | 2004-07-17 |
| *Trifolium kingii* | 16 | 2004-06-11 |
| *Trifolium kingii* | 13 | 2004-07-17 |

| Global name | Element occurrence number | Last observation date |
|---|---|---|
| *Trifolium kingii* | 15 | 2004-06-11 |
| *Trifolium kingii* | 11 | 2004-07-17 |
| *Trifolium kingii* | 14 | 2004-07-21 |
| *Trifolium kingii* | 12 | 1991-08-04 |
| *Triteleia grandiflora* | 1 | 2004-06-04 |
| *Utricularia minor* | 5 | 2000-09-01 |
| *Utricularia minor* | 1 | 1999-07-25 |
| *Viola pedatifida* | 35 | 2002-05-07 |
| *Viola pedatifida* | 24 | 2001-06-11 |
| *Viola pedatifida* | 34 | 2002-05-28 |
| *Woodsia neomexicana* | 29 | 2003-07-20 |
| *Woodsia neomexicana* | 30 | 2003-09-15 |
| *Woodsia neomexicana* | 27 | 2001-08-11 |
| *Woodsia neomexicana* | 31 | 2003-08-03 |

## Chapter IV. Element distribution modeling
**By Karin Decker**

In this study we used an iterative modeling approach to investigate the potential distribution of three rare plant species endemic to the Four Corners region: *Astragalus humillimus, Astragalus tortipes*, and *Sclerocactus mesae-verdae.* Models were constructed with spatially referenced datasets of environmental variables (i.e., elevation, slope, aspect, soil/geology, precipitation, and other factors). Modeling techniques are further discussed under "Methods" below.

It is important to regard these models as hypotheses intended to be field tested, and not as definitive maps of suitable habitat. A variety of life-history and biogeographic factors may preclude the presence of the target element in areas of predicted suitable habitat. Likewise, errors or lack of precision in modeling assumptions, input data, or procedures may incorrectly predict suitable habitat where none exists. In addition, users should be aware that the resolution of these distribution models is only as fine as the coarsest layer of input data (in this case 1 km-square cells). It is not appropriate to base land management decisions of 1-1000 m scale entirely on this analysis without additional field verification.

### Study elements

***Astragalus humillimus***, the Mancos milkvetch, is a perennial member of the Fabaceae or Pea family known from southwestern Colorado and northwestern New Mexico. It is more-or-less confined to sandstone rimrock and mesa tops formed in the Point Lookout Sandstone member of the Mesa Verde Formation (O'Kane 1988). Known occurrences are confined to tribal lands of the Ute Mountain Ute in Colorado, and the Navajo Nation in New Mexico. *Astragalus humillimus* is currently known from 4 element occurrences (consisting of 11 distinct mapped polygons) in Montezuma County, and from about 10 sites in San Juan County, New Mexico (NMRPTC 1999). The species is listed as Endangered under the US Endangered Species Act, and is ranked G1S1 - Critically imperiled both globally and in the state, at very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors) by the Colorado Natural Heritage Program (2009) and NatureServe (2009).

***Astragalus tortipes*** (sleeping Ute milkvetch) is a perennial member of the Fabaceae or Pea family known only from a small area near Sleeping Ute Mountain in southwestern Colorado. Known occurrences are confined to tribal lands of the Ute Mountain Ute. The species was first described in 1994, and survey data is sparse. *Astragalus tortipes* is currently known from 2 occurrences (comprised of 17 distinct mapped polygons) in Montezuma County, about 15 miles southwest of Cortez. Known occurrences are apparently confined to a particular portion of the Mancos Shale that is characterized by oyster and clam fossils (Colyer 2000). The species is ranked G1S1 - Critically imperiled both globally and in the state, at very high risk of extinction due to extreme rarity (often 5

or fewer populations), very steep declines, or other factors) by the Colorado Natural Heritage Program (2009) and NatureServe (2009).

***Sclerocactus mesae-verdae*** is a small, globose cactus, generally restricted to badland soils of the Mancos and Fruitland formation in southwestern Colorado and northwestern New Mexico. It is a moderately long-lived species. In Colorado, known occurrences are restricted to lands of the Ute Mountain Ute tribe. *Sclerocactus mesae-verdae* is currently known from 21-22 occurrences (point locations within what would essentially be a single large occurrence) in Montezuma County (CNHP 2009), about 15 miles southwest of Cortez, and from scattered locations in San Juan County, New Mexico (O'Kane 1988). The species is listed as Threatened under the US Endangered Species Act, and is ranked G2S2 (Imperiled both globally and in the state, at high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors) by the Colorado Natural Heritage Program (2009) and NatureServe (2009).

# Methods

## Input data

Our study area was the portion of Colorado contained within the San Juan Public Lands Area. Models were constructed with data from known locations of the target species using element occurrence records from the Colorado Natural Heritage Program database. Environmental attributes for both presence and absence points were derived from digital raster data in ArcGIS 9.2 (ESRI 2006). Datasets were processed to a common projection, clipped to the study area, and resampled as necessary to a 30 m cell size. Environmental data used and sources are listed in Table 9.

**Table 9: Environmental variables used in modeling.**

| **Continuous Variables** | **Units** | **Source** |
|---|---|---|
| Elevation | m | USGS 30m Digital Elevation Model (DEM) for Colorado |
| Local Relief | m | Derived from DEM |
| Slope | degrees | Derived from DEM |
| Annual precipitation | cm | Daymet - Climatological summaries for the coterminous United States 1980-1997 http://www.daymet.org/ (1km) |
| Monthly average precipitation | °C | Daymet |
| Monthly minimum air temperature | °C | Daymet |
| Number of frost days | days | Daymet |
| Precipitation frequency (proportion of wet days) | proportion | Daymet |
| Growing degree days – annual (average air temp above 0 °C) | degree-days | Daymet |
| Heating degree days - annual | degree-days | Daymet |
| Cooling degree days - annual | degree-days | Daymet |
| | | |
| **Categorical Variables** | **Values** | **Source** |
| Aspect | N, NE, E, SE, S, SW, W, NW, Flat | Derived from DEM |

| | | |
|---|---|---|
| Surface Geology | various | Colorado State Geologic Survey. 1995. The Digital Geologic Map of Colorado in ARC/INFO Format. From Tweto, O. 1979. Geologic Map of Colorado. |
| Soil type 1 | various | USDA Soil Conservation Service. 1994. General Soil Associations (STATSGO) for Colorado. |
| Soil type 2 (incomplete for study area) | various | USDA Soil Conservation Service. 1994. Soil Survey Geographic (SSURGO) Database for Colorado |
| Vegetation type 1 | various | USGS National Gap Analysis Program. 2004. Provisional Digital Land Cover Map for the Southwestern United States.Version 1.0. RS/GIS Laboratory, College of Natural Resources, Utah State University. |
| Vegetation type 2 | various | USDA Forest Service. 2006. LANDFIRE existing vegetation types www.landfire.gov |

**Initial variable investigation**

Values for each potential input variable were determined for all available point locations. In the case of continuous environmental variables such as climate and elevation, a rounded maximum or minimum value (whichever was believed most likely to have a real biological effect) was used to eliminate areas with unfavorable conditions. New raster datasets containing only the categories or range observed for model points were created, then intersected to identify all areas within the study area possessing the combination of all or most environmental conditions found at known locations.

**Model refinement**

Models were examined in comparison with known range and habitat descriptions, and different combinations of variables were tried. An attempt to identify the most important predictors of presence or absence was carried out using the Classification and Regression Tree (CART) technique, where absence points were a subset of the points compiled for previous modeling work in western Colorado (Decker et al. 2005). Results of this attempt indicated that the lack of absence points in nearby habitat was producing ecologically meaningless splits in classification.

The Maximum Entropy (Maxent) method was used to investigate the contribution of selected variables to predictive ability in a model. Variables with greater than 5% contribution to the model were retained and used to produce a new intersected raster dataset.

# Results

Predictive model of species distribution are based on the ecological principle that the presence of individuals of a species on the landscape is controlled by a variety of biotic and abiotic factors, in the context of biogeographic and evolutionary history. Because we rarely, if ever, have complete and accurate knowledge of these factors and history, we can only seek to predict or discover suitable habitat by using characteristics of known occurrences of the element in question. The modeling process is further constrained by

our inability to measure habitat characteristics accurately on a continuous spatial scale. As a result, modeling factors are usually an approximation of the environmental factors that control species distribution, using available data that is probably only a surrogate for the actual controlling factors. In recognition of these constraints, the models presented here are not 'probability' models, but represent areas where the correlation of mapped environmental characters is most in agreement with what is currently known about the individual species' requirements.

***Astragalus humillimus***

The final model incorporates elevation, geology, soils (SSURGO), vegetation type (SWReGAP) and average minimum February temperature (Figure 1). This produces a reasonable looking model where the most suitable habitat is concentrated on the mesa rims overlooking the Mancos River below Chapin Mesa, and edges of Tanner Mesa overlooking Tanner Canyon. Additional potentially suitable habitat extends north along the west rim of Mesa Verde. A few small areas to the north and west of Highway 160 have similar conditions, but are unlikely to support *Astragalus humillimus.* Suitable habitat in the SJPL area is entirely confined to the Ute Mountain Ute Reservation.

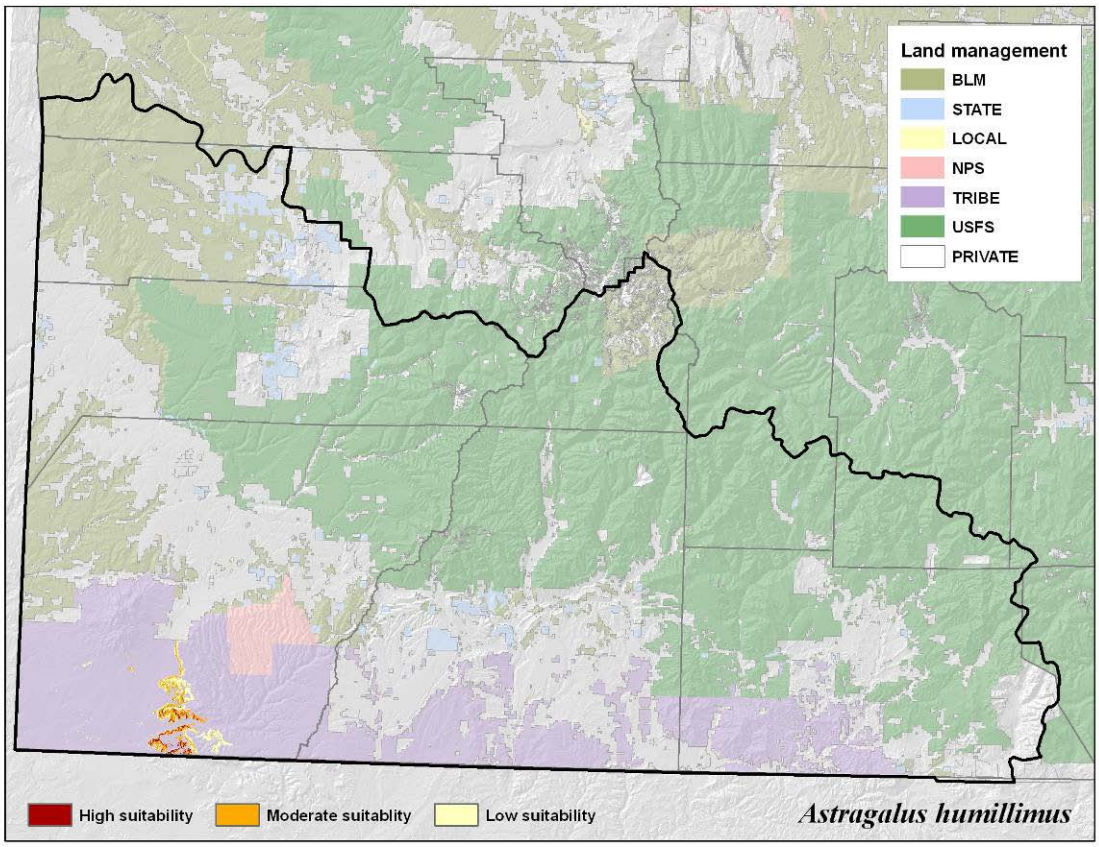



**Figure 7. Potential suitable habitat for *Astragalus humillimus* in the SJPL Area.**

***Astragalus tortipes***

Although Colyer (2000) documented several important environmental characteristics of occupied *Astragalus tortipes* habitat (aspect, calcium/potassium rich layer of Mancos Shale, presence of *Eriogonum clavellatum*), these factors are unfortunately not available

as geospatial data. Consequently, the results of the modeling process varied depending on the soil data used. Both versions are presented here. The final two models incorporate aspect, slope, elevation, geology, vegetation type (LANDFIRE), average March minimum temperature, and either STATSGO (Figure 2a) or SSURGO (Figure 2b) soil type. Although SSURGO is generally regarded as the better soils mapping, the STATSGO model appears more likely to reflect the highly restricted distribution of *A. tortipes*. Neither model shows highly or moderately suitable habitat on BLM lands.

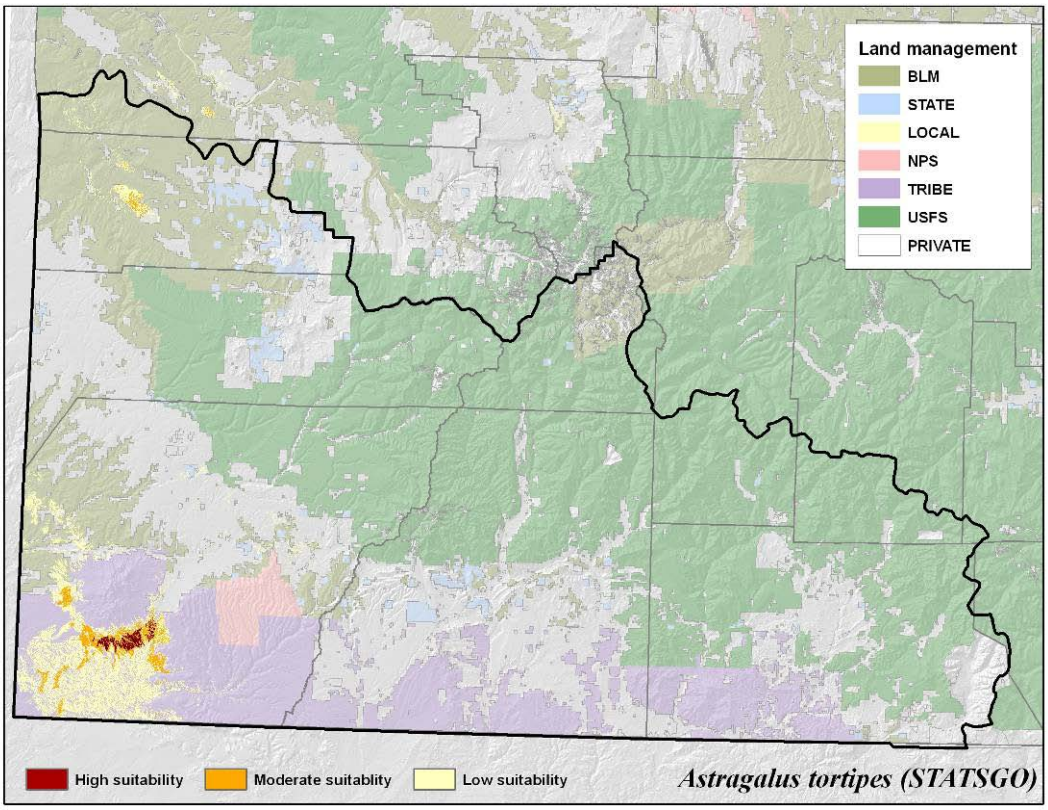



**Figure 8. Potentially suitable habitat for *Astragalus tortipes* in SJPL Area, STATSGO model.**

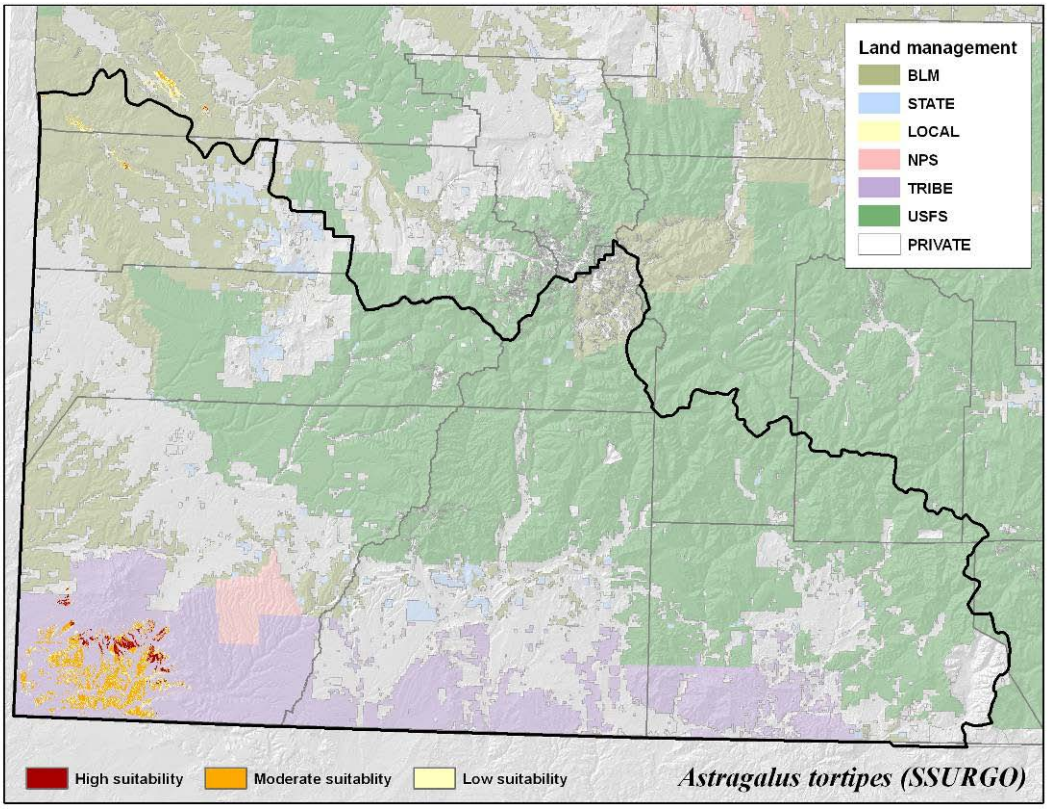



**Figure 9. Potentially suitable habitat for *Astragalus tortipes* in SJPL Area, SSURGO model.**

### *Sclerocactus mesae-verdae*

The final model incorporates geology, soils (SSURGO), vegetation type (LANDFIRE), and average minimum March temperature. Suitable habitat is concentrated in the broad valley of the Mancos River to the west of Mesa Verde and south of Sleeping Ute Mountain. The eastern portion of the model is in fairly close agreement with Porter's projected population limit of *S. mesae-verdae* in Colorado (Porter 1985), but also includes a substantial number of smaller patches extending west toward the Utah border that would be of interest in future survey work. It is interesting to note that apparently ideal habitat for the species also occurs 50-75 miles north of the known range in Disappointment Valley, Big Gypsum Valley, and Paradox Valley. A small amount of potentially suitable habitat overlaps BLM managed lands below the north rim of Mesa Verde. Although geology, soils, and vegetation type are similar to known habitat to the south, these patches may lie outside the temperature tolerance of the species. These areas were surveyed by Clair Button (BLM) in 1985.

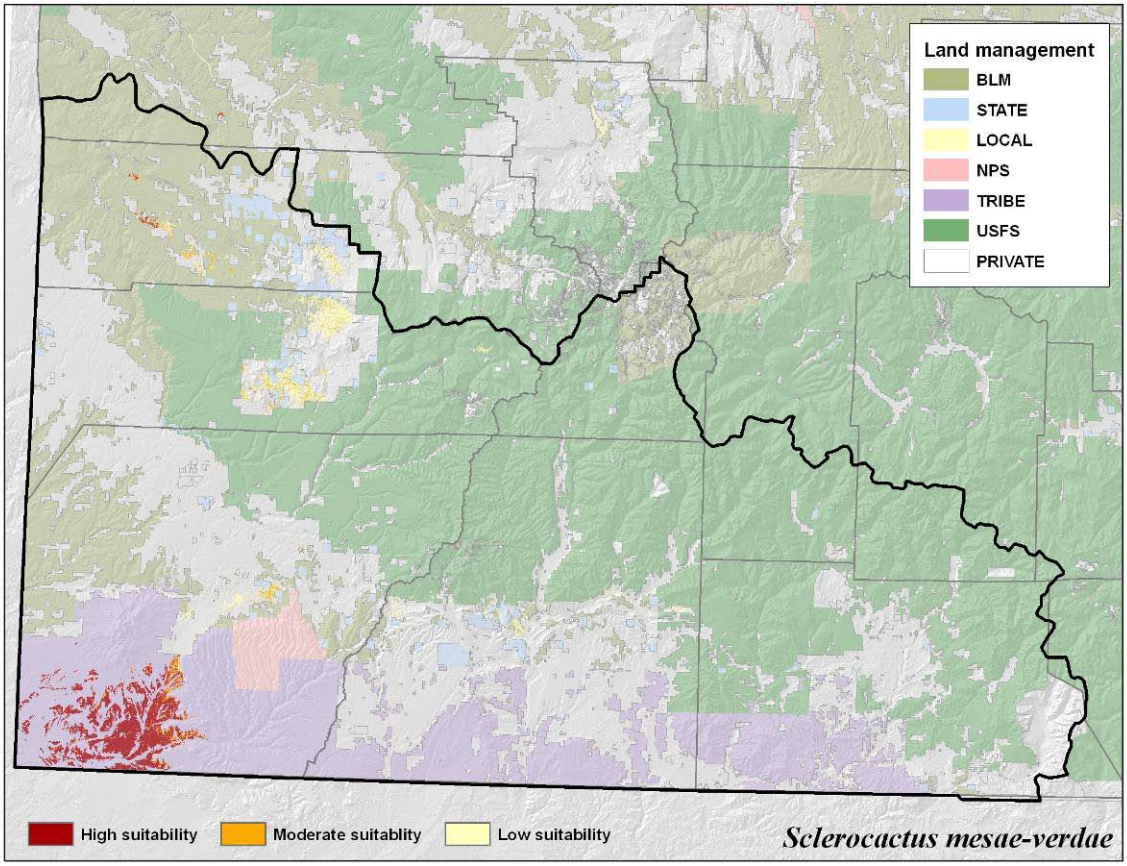



**Figure 10. Potential suitable habitat for *Sclerocactus mesae-verdae* in the SJPL Area.**

## Citations

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O'Kane, S.L. 1988. Colorado's Rare Flora. Great Basin Naturalist 48:434-484.

Porter, J.M. 1985. Map of projected population limits of *Sclerocactus mesae-verdae* in Colorado. Submitted to the Colorado Natural Areas Inventory.

# Chapter V. Species profiles for Special Status Species on San Juan Public Lands.

**Table 10. Special Status Plants Species on SJPL.**

| SPECIAL STATUS PLANT | DESIGNATION AND OCCURRENCE | NATURESERVE RANK |
|---|---|---|
| *Acarospora nodulosa* var. *nodulosa* | Highlight | G5, S1 |
| *Aliciella haydenii* | Highlight | G3, S2 |
| *Aliciella sedifolia* | FS Sensitive (S) | G1, S1 |
| *Aralia racemosa* | Highlight | G4, S1 |
| *Artemisia pygmaea* | Highlight | G4, S1 |
| *Asplenium trichomanes-ramosum* | Highlight | G4, S1 |
| *Astragalus deterior* | Highlight (S) | G1, S1 |
| *Astragalus humillimus* | Endangered (S) | G1, S1 |
| *Astragalus iodopetalus* | Highlight | G2, S1 |
| *Astragalus missouriensis* var. *humistratus* | FS Sensitive | G5, S1 |
| *Astragalus naturitensis* | BLM Sensitive | G2, S2 |
| *Astragalus proximus* | FS Sensitive | G4, S2 |
| *Astragalus schmolliae* | Highlight (S) | G1, S1 |
| *Astragalus tortipes* | Candidate, BLM Sensitive (S) | G1, S1 |
| *Bupleurum americanum* | Highlight | G5, S1 |
| *Calochortus flexuosus* | FS Sensitive (S) | G4, S2 |
| *Carex diandra* | FS Sensitive | G5, S1 |
| *Carex oreocharis* | Highlight | G3, S1 |
| *Carex retrorsa* | Highlight | G5, S1 |
| *Carex viridula* | Highlight | G5, S1 |
| *Castilleja lineata* | Highlight | G4, S1 |
| *Comarum palustre* | Highlight | G5, S1 |
| *Commelina dianthifolia* | Highlight | G5, S1 |
| *Cryptantha gypsophila* | BLM Sensitive | G1, S1 |
| *Cryptogramma stelleri* | BLM Sensitive | G5, S2 |
| *Cypripedium parviflorum* | FS Sensitive | G5, S2 |
| *Cystopteris montana* | Highlight | G5, S1 |
| *Descurainia kenheilii* | Highlight | G1, S1 |
| *Draba borealis* | Highlight | G4, S2 |
| *Draba graminea* | Highlight | G2, S2 |
| *Draba malpighiacea* | Highlight | G1, S1 |
| *Draba porsildii* | Highlight | G3, S1 |
| *Draba smithii* | FS Sensitive | G2, S2 |
| *Drosera anglica* | FS Sensitive | G5, S1 |
| *Epipactis gigantea* | FS Sensitive | G3, S2 |
| *Equisetum variegatum* | Highlight | G5, S1 |
| *Erigeron kachinensis* | BLM Sensitive | G2, S1 |
| *Erigeron philadelphicus* | Highlight | G5, S1 |
| *Eriophorum altaicum* var. *neogaeum* | FS Sensitive | G4, S3 |
| *Eriophorum chamissonis* | FS Sensitive | G5, S1 |

| | | |
|---|---|---|
| *Eriophorum gracile* | FS Sensitive (S) | G5, S2 |
| *Festuca arizonica* | Highlight | G4, SNR |
| *Gutierrezia elegans* | FS and BLM Sensitive | G1, S1 |
| *Gypsoplaca macrophylla* | Highlight | G3, S1 |
| *Hackelia gracilenta* | Highlight | G1, S1 |
| *Hamatocaulis vernicosus* | Highlight | G5, S2 |
| *Iliamna grandiflora* | Highlight | G3, S1 |
| *Ipomopsis polyantha* | Candidate, BLM Sensitive, FS Sensitive (S) | G1, S1 |
| *Lecanora gypsicola* | Highlight | G1, S1 |
| *Lesquerella pruinosa* | BLM and FS Sensitive | G2, S2 |
| *Listera borealis* | Highlight (BLM sensitive) | G4, S2 |
| *Machaeranthera coloradoensis* | FS Sensitive | G2, S2 |
| *Mimulus eastwoodiae* | BLM Sensitive | G3, S1 |
| *Parnassia kotzebuei* | FS Sensitive (S) | G5, S2 |
| *Pediocactus knowltonii* | Endangered (S) | G1, S1 |
| *Pediomelum aromaticum* | BLM Sensitive | G3, S2 |
| *Penstemon breviculus* | Highlight | G3, S2 |
| *Physaria cnema* | Highlight | GNR, SNR |
| *Physaria pulvinata* | FS and BLM Sensitive | G1, S1 |
| *Physaria scrotiforma* | FS Sensitive | G1, S1 |
| *Pinus ponderosa* | Highlight | G5, SNR |
| *Pinus strobiformis* | Highlight | G5, SNR |
| *Polypodium hesperium* | Highlight | G5, S1 |
| *Pseudotsuga menziesii* | Highlight | G5, SNR |
| *Salix arizonica* | FS Sensitive (S) | G2, S1 |
| *Salix candida* | FS Sensitive | G5, S2 |
| *Salix serissima* | FS Sensitive (S) | G4, S1 |
| *Sclerocactus mesae-verdae* | Threatened (S) | G2, S2 |
| *Sphagnum angustifolium* | FS Sensitive | G5, S2 |
| *Sphagnum balticum* | FS Sensitive | G3, S1 |
| *Sphagnum girgensohnii* | Highlight | G5, S1 |
| *Sporobolus nealleyi* | Highlight | G5, S1 |
| *Stellaria irrigua* | Highlight | G4, S2 |
| *Townsendia glabella* | Highlight | G2, S2 |
| *Townsendia rothrockii* | Highlight | G2, S2 |
| *Trifolium kingii* | Highlight | G5, S1 |
| *Triteleia grandiflora* | FS Sensitive | G4, S1 |
| *Utricularia minor* | FS Sensitive | G5, S2 |
| *Viola pedatifida* | Highlight | G5, S2 |
| *Woodsia neomexicana* | Highlight | G4, S2 |

S – No known occurrences, but suspected to occur due to potential habitat.

**Chapter VI. Incorporation of fen data, from Chimner et al 2005 (**Chimner, R.A, D.J. Cooper, K. Nydick and J. Lemly. 2005. Final Report: Regional Assessment of Fen Distribution, Condition, and Restoration Needs, San Juan Mountains. All appendices and data files are online at:
http://forest.mtu.edu/faculty/chimner/Research/San%20Juans%20Assessment.htm

Thirty-eight Plant Element Occurrence Records were added to the CNHP database in 2010.

**Table 11. Plant EORS from Fen survey**

| **Species** | **Global/State rank** | **Number of occurrences** |
|---|---|---|
| *Carex diandra* | G5 S1 | 4 |
| *Carex viridula* | G5 S1 | 3 |
| *Drosera anglica* | G5 S1 | 1 |
| *Eriophorum altaicum ssp. neogaeum* | G4?T3T4 S3 | 7 |
| *Hamatocaulis vernicosus* | G5 S2 | 7 |
| *Listera borealis* | G4 S2 | 1 |
| *Rhynchospora alba* | G5 SNR | 1 |
| *Sphagnum angustifolium* | G5 S2 | 9 |
| *Sphagnum balticum* | G3 S1 | 2 |
| *Utricularia minor* | G5 S2 | 3 |

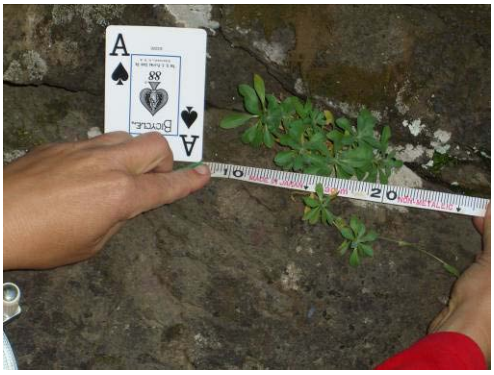
One hundred twenty-three community EORS were entered in the Observation database. A single fen may contain a mosaic of several different plant communities. Since time and budget did not allow including all communities within each fen, a representative community was chosen for each fen. In most cases, the area covered by each is not known. Therefore, the community chosen to represent the fen was based on its conformity to the National Vegetation Classification, its global rank, and the subjective opinion of the surveyor as to its relative importance in the fen. At a later date, this observational data may be incorporated in the CNHP element occurrence database.

**Table 12. Natural Community records entered in Observational database**

| Community | Global/State rank | Number of occurrences |
|---|---|---|
| *(Picea engelmannii) / Betula nana / Carex aquatilis - Sphagnum angustifolium* Woodland | G2 S2 | 11 |
| *Abies lasiocarpa - Picea engelmannii / Carex aquatilis* Forest | G4 S3 | 5 |
| *Calamagrostis canadensis* Western Herbaceous Vegetation | G4 S4 | 1 |
| *Caltha leptosepala* Herbaceous Vegetation | G4 S4 | 4 |
| *Carex aquatilis* Herbaceous Vegetation | G5 S4 | 14 |
| *Carex buxbaumii* Herbaceous Vegetation | G3 SU | 8 |
| *Carex illota* Herbaceous Vegetation | GUQ S2 | 12 |
| *Carex lasiocarpa* Herbaceous Vegetation | G4? S1 | 3 |
| *Carex limosa* Herbaceous Vegetation | G2 S1S2 | 6 |
| *Carex microglochin* Herbaceous Vegetation | GU SU | 1 |
| *Carex saxatilis* Herbaceous Vegetation | G3 S2 | 13 |
| *Carex scopulorum - Caltha leptosepala* Herbaceous Vegetation | G4 S4 | 2 |
| *Carex utriculata* Herbaceous Vegetation | G5 S4 | 1 |
| *Deschampsia caespitosa - Caltha leptosepala* Herbaceous Vegetation | G4 S4 | 1 |
| *Eleocharis quinqueflora* Herbaceous Vegetation | G4 S3S4 | 27 |
| *Salix planifolia / Calamagrostis canadensis* Shrubland | G4 S2S3 | 1 |
| *Salix planifolia / Caltha leptosepala* Shrubland | G4 S4 | 3 |
| *Salix planifolia / Carex aquatilis* Shrubland | G5 S4 | 5 |
| *Salix planifolia / Carex utriculata* Shrubland | GNR S2 | 3 |
| *Salix wolfii / Carex aquatilis* Shrubland | G4 S3 | 1 |
| *Salix wolfii / Carex utriculata* Shrubland | G4 S3 | 1 |

# Appendix I. Draba smithii photos, 2007 and 2009

**Clumps 1, 2 and 3 2007**



**Clump number 1 2007. 11 X 10 cm, 1 fl stem**

**Clump 1 2009. 19 x 12 cm, 1 fl stem**

**Clump number 2, 2007.**

**15 x 20 cm, 20 fl stems**

**Clump 2, 2009. 23 x 20 cm**

**1 fl stem**

**Clump number 3, 2007. 6 x 7 cm,**

**9 fl stems**

**Clump number 3, 2009. 9 x 11 cm,**

**2 ft. stems**

**Clump number 4, 2007. 20 x 6 cm,**

**no fl stems**

**Clump number 4, 2009. 26 x 14 cm,**

**1 fl. stem**

**Clump number 5, 2007. 17 x 10 cm, 7 fl stems**

**Clump number 5, 2009. 9 x 5 cm, 0 fl. stems**

**Clump number 6, 2007. No match found in 2009.**

**Clump number 7, 2007. 7 x 21 cm, > 20 fl. stems**

**Clump number 7, 2009. 20 x 22 cm, 6 fl stems**

**Clump number 8, 2007. 14 x 27 cm, > 20 fl stems**

**Clump number 8, 2009. 15 x 13 cm, 12 fl stems**

**Clump number 9, 2007. no match found in 2009**

**Clump number 10, 2007. No match found in 2009.**

**Clump number 11, 2007. 32 x 48 cm, > 20 fl stems**

**Clump number 11, 2009. 40 x 35 cm, 4 fl. stems**

**4 fl stems**

**Clump number 12, 2007. 33 x 30 cm, 4 fl stems**

**Clump number 12, 2009. 37 x 27 cm, 13 fl stems**

**Clump number 13, 2007.**

**no match found 2009**

**Clump number 14, 2007. 100 x 90 cm, >100 fl stems**

**Clump number 14, 2009. 75 x 76 cm, >100 fl stems**

(Clumps 15 to 17, and 19, no matches found in 2009)

**Clump number 18, 2007. 42 x 23 cm, >20 fl stems**

**Clump number 18, 2009. 44 x 24 cm, 8 fl stems**

**Appendix II. Species Lists from surveyed areas:**

**Plateau Creek, June 17, 2009**

**Canyon bottom:**

**Trees**
*Alnus incana*
*Juniperus scopulorum*
*Picea pungens*
*Pinus ponderosa*
*Populus angustifolia*

**Shrubs**
*Berberis fendleri*
*Crataegus erythropoda*
*Distegia involucrata*
*Mahonia repens*
*Opuntia fragilis*
*Padus virginiana*
*Pentaphylloides floribunda*
*Ribes inerme*
*Rosa woodsii*
*Rubus idaeus*
*Salix exigua*
*Salix geyeriana*
*Salix monticola*
*Symphoricarpos rotundifolius*

**Graminoids**
*Bromus inermis*
*Bromus tectorum*
*Carex hystericina*
*Carex lanuginosa*
*Dactylis glomerata*
*Eleocharis palustris*
*Juncus balticus*
*Phleum pratense*
*Poa pratensis*

**Forbs**
*Achillea lanulosa*
*Actaea rubra*

*Antennaria parvifolia*
*Apocynum androsaemifolium*
*Artemisia ludoviciana*
*Astragalus bisulcatus*
*Astragalus lonchocarpus*
*Astragalus missouriensis*
*Carduus nutans*
*Chrysothamnus nauseosus*
*Cirsium arvense*
*Cirsium tracyi*
*Cornus sericea*
*Cystopteris fragilis*
*Drymocallis arguta*
*Equisetum arvense*
*Eremogone fendleri*
*Erigeron flagellaris*
*Eriogonum flavum*
*Fragaria vesca*
*Galium septentrionale*
*Geranium richardsonii*
*Halerpestes cymbalaria*
*Heterotheca villosa*
*Heuchera parvifolia*
*Hippochaete hyemalis*
*Humulus lupulus*
*Ipomopsis aggregata*
*Linum lewisii*
*Lithospermum multiflorum*
*Maianthemum racemosum*
*Maianthemum stellatum*
*Medicago lupulina*
*Melilotus officinale*
*Mentha arvensis*
*Oenothera cespitosa*
*Phlox longifolia*
*Plantago major*
*Polemonium foliossimum*
*Rudbeckia ampla*
*Taraxacum officinalis*
*Thalictrum fendleri*
*Thermopsis montana*
*Toxicodendron rydbergii*
*Valeriana edulis*
*Vicia americana*

**Canyon rim, west:**

**Trees**
*Populus tremuloides*
*Pseudotsuga menziesii*

**Shrubs**
*Amelanchier utahensis*
*Artemisia nova*
*Quercus gambelli*

**Graminoids**
*Bouteloua gracilis*
*Carex occidentalis*
*Festuca arizonica*
*Poa fendleriana*

**Forbs**
*Androsace septentrionalis*
*Antennaria dimorpha*
*Besseya plantaginaea*
*Coriflora hirsutissima*
*Eremogone congesta*
*Eriogonum alatum*
*Fragaria virginiana*
*Gutierrezia sarothrae*
*Heterotheca villosa*
*Lithospermum multiflorum*
*Penstemon cespitosum*
*Petradoria pumila*
*Potentilla hippiana*
*Sedum lanceolatum*
*Selaginella densa*
*Senecio neomexicana*

**Canyon rim (east)**

**Shrubs**
*Arctostaphylos uva-ursi*
*Artemisia frigida*
*Artemisia nova*
*Pentaphylloides floribunda*

**Graminoids**
*Festuca arizonica*
*Pasmcopyrum smithii*
*Poa fendleriana*
*Poa pratensis*
*Poa secunda*

**Forbs**
*Achillea lanulosa*
*Allium acuminatum*
*Antennaria dimorpha*
*Antennaria rosea*
*Artemisia ludoviciana*
*Astragalus missouriensis*
*Chrysothamnus viscidiflorus*
*Cirsium tracyi*
*Eremogone fendleri*
*Erigeron flagellaris*
*Eriogonum flavum*
*Eriogonum umbellatum*
*Erythrocoma triflora*
*Heterotheca villosa*
*Linum lewisii*
*Penstemon cespitosum*
*Potentilla hippiana*
*Sedum lanceolatum*
*Tragopogon dubius*

**Forest Road 510, to Dry Canyon (McPhee Reservoir)**

**Mountain shrub community: Quercus gambelii/Purshia tridentata**

**Trees**
*Pinus edulis*

**Shrub**s
*Amelanchier utahensis*
*Artemisia nova*
*Artemisia tridentata ssp. vaseyana*
*Cercocarpus montana*
*Mahonia repens*
*Peraphyllum ramosissimum*
*Quercus gambelli*

**Graminoids**
Bromus tectorum
Poa fendleriana

**Forbs**
*Antennaria dimorpha*
*Balsamorhiza sagittata*
*Chrysothamnus sp.*
*Comandra umbellata*
*Cordylanthus sp.*
*Eremogone congesta*
*Erysimum capitatum*
*Linum lewisii*
*Lomatium grayi*
*Penstemon cespitosum*
*Petradoria pumila*
*Psilochenia runcinata*
*Shale, but not the right stuff.*
*Toxicoscordion venenosum*
*Wyethia X magna*

**Species List at *Physaria cnema* site, Forest Road 514**

**Trees**
*Pinus ponderosa*

**Shrubs**
*Amelanchier utahensis*
*Artemisia tridentata ssp. vaseyana*
*Mahonia repens*
*Quercus gambelli*
*Rosa woodsii*
*Symphoricarpos rotundifolius*

**Graminoids**
*Festuca arizonica*

**Forbs**
*Astragalus flexuosus*
*Eremogone fendleri*
*Eriogonum alatum*
*Erysimum capitatum*
*Penstemon cespitosa*
*Penstemon linarioides*
*Potentilla hippiana*
*Pseudocymopterus montana*
*Senecio neomexicana*
*Tetraneuris torreyana*